

PRACTICAL TRANSPORT MANAGEMENT

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FOREWORD

BY SIR JOSIAH STAMP, K.B.E., D.Sc.

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SINCE the earliest ages even the most primitive community has had in some form or other required transport—the movement of men and things from one place to another—as an integral part of the daily machinery of its commerce. At all times the need for efficiency and economy in this essential service has been necessary, but never more than in the difficult years which have followed the World War. The establishment of the Institute of Transport as a central body for the study of all classes of transport work and the exchange and dissemination of information relating thereto has been of considerable public value, and this series of books, particularly designed to fit into its educative schemes, is a most useful complement.

This volume, dealing with the economy of goods transport arrangements generally, from the point of view of manufacturers and other traders, is a welcome addition to the series. Covering a phase which books on particular services cannot, it will be of interest, not only to those concerned in obtaining transport for their own needs, but also to those concerned in supplying it.

J. C. STAMP.

PREFACE

THIS treatise deals with "Transport Management" as it affects the Industrial Transport Manager—it does not aspire to deal with traffic control on Railways, Roads, Seas, or in the Air. Commercial or Industrial Transport Management is a profession apart from these, although the responsible officer must possess a particularly wide knowledge of transport in all its phases.

It is only within recent years that industrialists have placed their transport and their transport difficulties in the hands of an expert, and surely the need was never greater—although it may be even greater as the opportunities of movement become wider in scope—for specialist treatment of transport matters.

Practically every manufacturing and commercial establishment, including Chambers of Commerce, City, Town, and Urban Councils, has such an interest in transport that it is inevitable that they will, sooner or later, require the services of the transport expert. Nowadays, the greatest skill is required in purchasing transportation; in fact, just as much, if not more, than that required in buying any commodity used in manufacture.

Much has already been written on the subject of "Transport Management," especially in so far as the subject is affected by commercial matters such as railway rates, the effect of the Railways Act, 1921, the trader's legal position, etc., but very little opportunity has been given to the student of approaching the subject from the practical standpoint.

The Author is indebted to Mr. Charles Nichol, late Traffic Manager, Messrs. Armstrong, Whitworth & Co., Ltd., for his assistance in confirming certain traffic working and shipping arrangements and for reviewing the treatise generally.

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PRACTICAL TRANSPORT MANAGEMENT

CHAPTER I

THE SITE AND LAY-OUT OF A FACTORY

THE prime factor to be taken into consideration in siting a factory is that the location shall be in close proximity to markets. If the main disposal is overseas then, obviously, consideration must at once be given to nearby shipping facilities, and if raw materials have to be imported the reason for adjacency to an important shipping port is clear.

The Importance of Economic Distribution.

Distribution costs are an item which has an important bearing on profits, and even the question of the proximity of raw materials must give second place to the speedy marketing of the finished article. It costs more to transport products than raw materials.

Whilst mass production and large factories may cut overhead items of expenditure, owing to heavy costs of distribution there is a tendency to reduce the size of factories and increase their number in order to give effect to speedy deliveries and to reduce transport charges. The present-day tendency of buying in smaller quantities is also a factor to be taken into consideration in dealing with transport charges. Smaller lots mean increased transport costs, but the position in this respect will tend to increase, and manufacturers will be well advised to take due cognizance of such an important change in buying methods.

Sales should be covered as near to the manufacturing

source as possible. Long hauls, later deliveries, greater risk of damage, heavy freight charges, all reduce profits. In many cases large concerns find it an advantage to ship their products to large towns and cities, and warehouse there, re-distributing again to local points. This, of course, involves double handling charges, heavier insurance, and possibly the need for local transport staffs.

However, when it is necessary to warehouse goods at distribution points, it is important that the site of these warehouses shall be, as far as possible, adjacent to local railway and shipping facilities; at the same time they should be arranged in cities or towns from which a thoroughly good road transport service emanates, so that re-distribution can be carried out at a minimum of cost and with the greatest expedition.

In bygone days factors which would now be considered absolutely unimportant have been the means of siting a factory location, but transportation progress, changing industrial and geographical conditions and other causes have neutralized the original considerations. This changing is important. We hear in England of industry gradually moving South. Coal mining has developed in Kent. The industrial North is not what it was, and who knows what further changes will develop in the near future?

Mr. Norman F. Titus in an address before the Associated Traffic Clubs of America,¹ has stated that a factor transcendent in the American Industrial Revolution to date had been the unquestioned leadership of American industry. It presents the striking anomaly of paying the highest real wages in the world, yet competing successfully with nations of a lower standard of living. Its success has been so conspicuous that commissions have come from Europe and Australia during the last two or three years to discover the economic trick whereby such unusual results have been accomplished. The truth is there is no trick save that America's attainment has been due to SOCIAL as well as economic forces. Nevertheless,

¹ *Traffic World* (American), 27th April, 1929.

the fact remains that American achievements have been, and are, the marvel of all other nations.

An analysis of these achievements, however, discloses that they are mainly the perfection of production. American skilled engineers have started with the origin of the raw materials, and then examined each step of manufacture up to the completion of the process and the delivery of the goods to the shipping room, ready for distribution to the customer. They have divided the processes into component parts—studying the time factors involved in the handling of a tool or the shifting of a piece of material, eliminating in that way one detail of waste after another. Eagle-eyed efficiency experts have re-arranged machines and even re-designed factories to save a few steps for the worker, and with the intention of shortening time and distance between raw material and finished product. Thus we have seen developed what is known as straight-line production.

In spite of such distinctive achievements in production, engineers, to a large extent, have overlooked another vital factor, namely, distribution. It is just as necessary to achieve straight-line distribution as it is to achieve straight-line production. Opportunities for waste and inefficiency exist in large numbers in the movement of goods from producer to consumer. In this cycle we have—

Movement of goods in factor's shipping department.

Containers and interior packing materials.

Packing processes.

Wagon loading, or cartage to freight shed or pier.

Route and haulage distance.

Handling involved by carrier.

Wagon unloading or cartage from carrier to buyer.

Handling in buyer's receiving room.

These operations of packing, handling, and transportation constitute the field of physical distribution, which costs industry, to-day, in the United States of America, approximately twelve billion dollars. In 1927 engineers appointed by Mr. Hoover to outline his campaign of waste

elimination conservatively estimated distribution losses, through inefficiency, to be at least 10 per cent, although in certain of the operations the losses were estimated to be many times this percentage. This drain upon industry reaches a staggering total.

In the field of physical distribution the transportation company bears but a minor part of the cost, the larger part being within the control of shipper and buyer. In this domain of physical distribution there have been distinctive accomplishments along the following lines—

1. PACKING ENGINEERING.

Through this agency, shippers have been able to reduce the quantity of lumber and nails in their containers, though yet producing a stronger package. For instance, 25 cents per crate saved in materials on 300,000 crates increase dividends by \$75,000.

2. MATERIAL HANDLING.

The most striking advance in this field has been made through the use of skid platforms and lift trucks; also by mechanical devices, i.e., belt conveyors, tiering machines, etc.

3. EXTENDED USE OF THE MOTOR TRUCK.

Traffic experts are recognizing the motor truck as a co-operative rather than a competitive factor in transportation. Outstanding illustrations of this co-operation in rail-roading are found in store-door delivery, handling of unit containers, and in terminal transfer.

4. PROGRESS IN RAIL AND OCEAN TRANSPORTATION.

A pertinent example is the recent announcement by the American Railway Association that railway efficiency has increased 58 per cent since 1920.

5. DEVELOPMENT OF INLAND WATERWAYS.

Governmental demonstration and European example reveal an enlarged scope for the handling of bulk raw materials through the medium of inland waterways.

The transport manager can be of the greatest assistance in giving constructive advice in the selection of sites for works or factories. In many cases plants have been laid down without due consideration having been given to questions of economical distribution or local transport conditions generally, whereas full cognizance of these conditions would have saved considerable cost and probably have meant more markets for the commodity.

There is no doubt that transport represents the bloodstream of industry, and the study of transport is becoming more and more important within the range of industrial development.

Field of Raw Materials

Second in importance to the proximity of the factory to the distribution points and selling areas is the question of the availability to the source of supply of raw materials. In this connection, the factory which uses a large amount of fuel should be situated as near to the coal-fields as is possible. Should selling considerations outweigh this, the fuel would possibly have to be shipped to the nearest port, by river or sea, which would then make a shipping port or inter-works water facilities near at hand an important necessity.

Apart from fuel, a great deal of raw material may require to be imported, and in addition to proper shipping facilities, the question of storage ground in due proximity to the plant has to be kept strictly in mind. Accommodation should be reserved for the erection of suitable equipment such as overhead tipping gantries leaving sufficient room for approach and dispatch of wagons.

If private wharf working in the factory area is feasible,

raw materials should be stored as nearly as possible to the discharging point, so as to ensure rapid discharge of the ship by allowing for quick turn-round of the wagons used in conveyance.

If means of storage other than those specified are contemplated, such as the laying down of fuel by ordinary locomotive cranes and grabs, consideration has to be given to the fact that extra storage ground has to be made use of owing to the restriction of height of stock due to possible heating, or crane accessibility. In such circumstances, space must be allowed for rail tracks between the dumps, due regard again having to be paid to the span reach of the cranes used.

Distance and cost of conveyance are, of course, of special significance where raw materials are concerned. Should rail connections only be involved, the service and rail facilities likely to be available—keeping in view the volume and nature of the traffic—must be the subject of careful investigation between the trader and the railway company or companies concerned. The working and facilities of docks, coupled with tide conditions, must also be thoroughly investigated. Handling costs at the point of discharge and freight charges must not be left out of account.

If road conveyance is to be the method of transport of raw materials, types of vehicles, road conditions, loading facilities and dock delays are all of necessary significance.

Railway Connections and Service to Main Line Junctions and Ports

It may be said that it is extremely advantageous to select a factory site which is adjacent to or on main railway lines. After all, railways are still the chief means of transport in this country, and it is half the battle if main line connections to all parts can be made within a short space of time. Proximity to the field of raw materials and shipping ports has already been stressed, and since direct train loads, either inwards or outwards, cannot always

be made up immediately to or from the works, proximity to main line junctions is extremely beneficial by way of ensuring quick transit for finished products and regular deliveries of inwards goods.

In addition to this, many advantages are to be gained where more than one railway company operate, and where private siding accommodation can be arranged with competing railway companies.

Railway companies usually give good service to and from ports. This is necessary in order that dock lines may be kept free from congestion, and also that ships can be loaded and discharged with the minimum amount of delay. Raw materials in bulk are invariably dealt with in train loads, and immediate services arranged.

The question of wagon supply is affected by proximity to important railway centres and distribution points, as, undoubtedly, the nearer the works are situated to these junctions the better chance there is of the supply of rolling stock being maintained and all requirements in this direction speedily fulfilled.

It is presumed that consideration has been given to the question as to whether private siding connection is really a necessity. This depends on the volume of traffic which it is anticipated will be handled, and, in reality, resolves itself into the problem of whether it is cheaper to have all the material carted to and from the nearest railway station or bear the cost of internal shunting.

Private sidings are the subject of agreement with the railway company concerned, and include items of land, construction and maintenance. The agreements are drawn up with special reference to the details of each individual case, conforming, of course, to the law as particularly affected. The negotiations in connection with private sidings should be carried out by the trader's legal advisers, acting on the advice of the transport manager. An important point to be considered besides those already indicated is that of terminal rebates. These depend on the class of goods involved and whether cartage service will be

necessary. In connection with the amount of space and the number of private sidings involved, there are certain factors which have to be taken into account in reckoning the number of wagon-lengths which have to be provided within the factory. Firstly, it should be known to what extent incoming wagons can be utilized for outward loads, bearing in mind the railway companies' non-common user arrangements and restrictions as regards the loading out of special class wagons.

Secondly, the average load of the different classes of traffic should be worked out, and this, taken with the anticipated daily receipt on a tonnage basis, should indicate the number of wagon-lengths required for inward traffic. In the case of raw materials, due allowance should be made for week-end and holiday standages. When it is found approximately how many inwards wagons can be made use of for outward traffic, the numbers of empty wagons required to be called for can be taken into account. A round figure in the calculation of wagon-lengths is 20 ft.

As regards accommodation for outward traffic, it will usually be found that fewer sidings will be required than are necessary for incoming traffic as the railway companies usually provide a service which will ensure rapid clearance of outgoing loaded and empty wagons. Some additional space may require to be catered for to meet week-end working, or for traffic awaiting shipping instructions. It is a "penny wise and pound foolish" policy to stint in the way of siding accommodation, especially those accommodation sidings where connection is made with the railway company. Inadequate accommodation in this respect means delay and trouble with the carriers, and involves additional locomotive power cost to the trader on account of extra clearances having to be made to keep the traffic moving.

Road Conditions and Services.

As with railways, so with roads in the matter of main lines of communication. Although great strides are now

being made in the improvement of second class roads and the construction of new highways, nevertheless, where long distance road haulages are contemplated it is a great adjunct if vehicles are able to strike main roads at nearby convenient points.

This is extremely important if hired road transport is contemplated to any extent, because vehicles requiring return loads—the majority of which pass over main roads—can be called into service.

It has to be borne in mind that road transport services are daily becoming more highly organized, and no doubt it will be the policy of governments to see that highways are improved and augmented to meet the new conditions.

The consideration of the question of lay-out in relation to road services, of course, depends to a very large extent on the industry concerned. For instance, the heavy industries such as coal, iron and steel and heavy engineering are not, as yet, deeply concerned in road transport, although improvement in the design of motor vehicles is tending to develop the transport of heavy materials, such as pig iron and large out-of-gauge loads, over the highways.

While road transport may give effect to direct discharge at the receiving end, it may involve double-handling at the loading end, because it is not always possible to arrange roadways into all the manufacturing sections of a factory.

It is sometimes advisable to allow for a transshipping station for road vehicles at a suitable part of the plant in order that loads may be transferred to and from railway wagons at this point. This is suggested in cases where it is not possible to arrange both inter-factory roads and railways.

The position and state of local roadways is important to the trader, who must also consider whether the advent of his factory will have the effect of improving or augmenting the highways in cases where it is anticipated that a large number of road vehicles will be utilized

for transport purposes. Road delays, especially in and around industrial centres, are tending daily to become more and more serious.

The day may not be far distant when large users of commercial road transport may find it expedient to seek powers for the creation of private highways from their plants to connect with main arterial commercial roads.

Traffic density on the roads has now become a matter of serious moment, and roads of widths up to 40 ft., or of even greater width—to allow of adequate provision for “up” and “down” traffic as well as to allow of the segregation of “fast” and “slow” transport—will very soon become necessary. The obtaining of road powers by the railway companies will sooner or later result in short distance sundry traffic leaving the rail with a consequent increase in road transport.

Undoubtedly, a new era in transport on the highways has begun, and the importance of this cannot be underestimated when the question of lay-out and creation of a new plant or factory comes to be considered.

Position of Seaports and Inland Water Services.

The transport manager usually finds that the more sources of transport he can tap the more efficient and economical is the service he can arrange—to the advantage of his company. While it is, perhaps, too much of an ideal to anticipate a lay-out which will be convenient to all forms of transport, it is usually found that sea transit, coastwise shipments and inland waterways are all more or less of vital importance. Short sea and coastwise transit provide alternatives to quicker but more expensive means, and if speedy delivery is not an immediate consideration, then these services may be of extreme importance as affecting either import or export traffic. Although additional handling may be entailed, the question of cost may be found to outweigh other considerations.

If it is decided to locate the factory with direct sea or

deep river connection, the question of the erection of suitable dock, wharf, or jetty accommodation with the necessary rail and road facilities, and the provision of sufficient land to allow of this—keeping in view the possibility of extensions—must be borne in mind.

Provision must be made on whatever form of water front is necessary for the requisite handling equipment, railway sidings on and adjacent, offices including tackle store, customs accommodation and mess rooms, as well as warehousing, having regard to the particular classes of goods to be dealt with. Generally, inter-works water connection does not imply waterside storage, as import and export traffic can be handled direct to the works' storage points or direct from the manufacturing plants to the ship's side.

It is possible that within the near future the question of inland water transport in the matter of canals will be seriously reviewed. If improvements in width and depth, coupled with certain extensions and amalgamations, can be taken in hand, there is no doubt that canals can profitably be utilized for classes of traffic where urgency is not a prime factor. Inland waterway facilities adjacent to a factory prove of unquestionable usefulness in the conveyance of materials from deep sea wharves by means of lighters or barges.

These are points of extreme interest to those responsible for the planning or for the lay-out of a factory, as the importance of transport costs, in the general economical survey of the situation, cannot be under-estimated.

Competing Considerations.

In almost all branches of industry nowadays, keen competition has to be faced both from home and from sources abroad, and, in order to minimize such disadvantages and reduce costs, correct location in relation to economical distribution is a vital factor.

It was at one time thought that cheap land outweighed

any other considerations in the selection of a factory site, but this phase is now entirely covered by the more important attention which has to be given to transport problems. Cheap land, even with railway facilities against a branch line, would prove to be no bargain if transport costs were high, and severe competition could not be effectively met.

Owing to extreme competition, contemplation is now being given to the removal of factories from heavily rated centres to new sites, where more favourable rating conditions exist and where better transport facilities—especially as regards the new field opened up by road transport and in the near future by commercial air services—can be of such vital economic importance to manufacturers.

In laying-out or planning for a new factory, stock can be taken of general present-day conditions with especial reference to transport and transport costs; and the results of this must of necessity be against competitors. Then again, old established concerns may, on account of rapidly changing conditions in the world of transport, be obliged to consider the transfer of their factories or the erection of branch factories on sites more suitable to the field of distribution.

Rationalization of industry and the scrapping of out-of-date and uneconomical plants may induce the erection of new factories at places entirely away from the old industrial centres. Undoubtedly, a new industrial problem is the modernization of old plants. There is little doubt that our heavy industries are suffering from this complaint, and when the necessary capital becomes available a new field of enterprise with a higher output per unit will be anticipated. Plants erected in post-war years, in expectation of a lively trade, will either take the place of older works or in themselves become excess or obsolete. Competition demands that strict attention be paid to factory location in relation to distribution points. Service to buyers is all important.

Local Conditions, Labour, Rates, Housing.

Within recent years there has been a decided trend of industrial movement in England, southwards, mainly no doubt, due to the fact that in the Northern and Midland districts, where for some time unemployment has been rife, rates have increased to such an extent that the question of rates in relation to factory lay-out has taken precedence over all other considerations.

Generally speaking, it is not difficult to secure labour nowadays in any part of the British Isles, and even apart from a government arrangement of transfer, men will very willingly, and often at great inconvenience to themselves, transfer to a district where the prospect of regular employment is held out to them.

Housing problems are still acute in most places, and with the advent of a new factory—involving the employment of a large number of workers—it is important that due cognizance be taken of the undernoted points—

1. The present housing scheme or likely scheme in adjacent towns.
2. To what extent local labour, already housed, can be employed.
3. Transport facilities to nearby towns and villages.

In regard to the last-named, it is now possible with the advent of improved road transport facilities to consider a radius of ten miles as being well within the scope of a labour field. Omnibus companies are prepared to run services which will meet the needs of the workpeople engaged on regular day or shift work. In fact, shift-workers offer the road transport people a remunerative traffic in that return loads are always available and empty running unnecessary. Convenient omnibus arrangements can be made for quite small numbers of men, and the omnibus owners usually offer extremely low fares for workpeople.

As regards railway services for workpeople, the railway companies will no doubt at once arrange special

workmen's services, but, of course, whether the railway service will be made use of depends to a large extent on the proximity of a railway station. If the factory is served by railway connection and the main line is adjacent, the railway company, if the prospective traffic warrants, may construct a halt to deal with the requirements of the workpeople. If a long private branch line connection is involved, the factory owners may provide a passenger service of their own to connect with main line facilities.

Town planning and industrial housing sites are not without extreme interest to the transport expert, and it is doubtful whether due attention is paid to the many phases of such problems which are affected by transport, not only as regards transport services themselves, but, for instance, in road construction and in the provision of suitable land to meet future air developments.

Internal Communications, Railways, Roads, Ropeways, and Conveyor Systems.

The problems of economical handling and movement of material within a factory present in many cases a good deal of difficulty. First of all it may be that alterations and additions to the works have taken place since the first buildings were erected, and, generally, it is found that original plans or restriction of space do not allow of such additions being made with due respect to the question of economical handling as between departments or with the ultimate sources of transport communication.

There are, of course, many internal systems to meet the needs of all classes of user and to carry all classes of material. Railways, with shunting carried out by steam or electric locomotives, road transport (covered by motor vehicles including light or heavy lorries and tractors or horse lorries and vans), and where the process of manufacture is carried out in different buildings—conveyor systems and overhead ropeways—represent the general type of equipment.

Capstans are a great asset where a railway system

exists, and these eliminate the need for constant locomotive attention. A great deal of shunting work can be eliminated by those responsible taking full cognizance of gradients to allow of gravity shunting being introduced.

The transport manager is in the best position to advise on the most efficient and economical means of handling material, with due relation to all the circumstances involved.

The questions of the speedy delivery of stores, the packing, loading, and warehousing of the finished product, and the careful stocking of raw material are all-important, and must be given their true measure of consideration. The service which can be given to material required in the case of breakdowns must also be regarded as one for mature deliberation.

Even the transport of workpeople within a factory can be reckoned as vital in that it affects the loss of time through men being transferred from one job to another, and the time taken in accomplishing this movement of labour. It is astonishing how many man-hours can be lost in an eight-hour shift through this cause.

In connection with transport facilities internally, the fact should not be overlooked, when considering lay-out, that provision must be made for adequate locomotive shed accommodation which must include facilities for washing-out, tubing, cleaning, sand-drying and lighting-up, as well as for oil, waste, lamps, and other shunting equipment. If a small number of engines is involved, the question of repairs can conveniently be coupled with the running shed, but where more than, say, twelve locomotives are on the strength, land should be reserved for the erection of a proper repair shop.

Similarly with a road fleet; due regard should be given to garaging and repairs, allowance being made for any possible extensions. Should the company possess its own fleet of steamers, hoppers, lighters, or barges, besides the ordinary wharf or dock accommodation for loading and discharge, provision should be made for the carrying out of

running repairs. Should a large transport fleet comprising all classes of vehicles be involved, it may be economically necessary to consider the erection of a transport repair shop of adequate dimensions sufficient to meet the needs of the department.

Costs in internal handling are not always realized to be of especial significance in the consideration of works costs as a whole, so much so, that material handling is often carried on by antiquated means. New mechanical methods are now available which are rapidly dispensing with the necessity for hand labour in all departments of industry. Electric trucks, skid platforms, lift trucks, conveyor systems of various kinds, drag-line scrapers and numerous other mechanical types are to be found in advertisers' lists.

The Ideal Lay-out from a Transport Point of View

As would be expected, the ideal lay-out of a factory from the transport manager's point of view would be one that offers the best means of giving cheap service to the lines of communication, whether these be railway, road, canal, river, or sea. Of course, the question of commercial air transport is looming more and more into the region of practical politics, and, no doubt, the factory of the future will be equipped with a landing ground and loading facilities for aircraft. It may be that the roofs of factory buildings will be adapted to accommodate this form of transport service and hoists introduced to allow of direct and quick loading. Business men may even find it convenient for passenger service aeroplanes to pick them up from their factories under the system indicated.

It is, of course, understood that different types of industry may only require one or other of the types of transport or, on the other hand, it may be impossible to connect directly with all means of communication. Still, it is none the less essential that the ideal should be sought after.

In considering the ideal lay-out from the transport manager's point of view, after the location of a factory

has been selected and due regard has been paid to external transport communications, there still remains the method of lay-out and construction and the internal transport arrangements in relation thereto. It is extremely easy to overlook important items of inter-works distribution and economical means of movement during the construction deliberations. Engineers arrange buildings and omit the essential road or rail facilities. Extensions to individual plants have to be made, and sacrifice of railways or roads is decided upon. This can only have one result—increased handling and increased cost in manufacture. The days of ignoring the first-hand needs of transport are over. The transport expert cannot be ignored any more than movement can be eliminated. In matters of transportation, which are inevitable in all branches of business, there is an unlimited field for investigation, and the advent of the professional transport adviser is the unquestionable need of the moment.

CHAPTER II

WORKS ORGANIZATION

IN a general way, large industrial works do not differ much from one another in their departmental organization. Apart from general principles, there must, of course, be variation in methods in accordance with the particular branch of industry concerned.

General Principles.

Following the appointment of a Board of Directors, the officials of the company must be selected. These are of the following designations—

Secretary.

Accountant.

Treasurer.

Cashier.

General Manager.

Works Managers.

Engineers.

Commercial Manager.

Transport Manager.

Research Manager.

The directors are responsible to the shareholders mainly for the efficiency of the undertaking which will result in a reasonable return on the capital invested.

The secretary is the means by which the board, generally through the medium of the managing director, is kept informed of all confidential matters, and he, on the other hand, is charged with the duty of communicating to interested officials the instructions of the board as regards change of policy, staff questions, and matters affecting finance. The secretary can be considered the *via media* between the board of directors and the officials of the company.

The general works manager is mainly responsible for

efficient and economical production, for the conduct of labour, and for the co-ordinating of all reports and general information, which will result in an ever vivid picture of the situation being available. These reports will emanate from the various works managers or plant managers, who will, of course, have under them certain subordinates who are responsible for seeing that orders are duly carried out.

The remaining officials are responsible to the executive authority for the conduct of their respective departments.

An organization can be divided into Production, Secretarial, Commercial, Service, and Research units, as follows—

Production	.	.	.	General Manager. Works Manager.
Secretarial	.	.	.	Secretary Accountant. Cashier.
Commercial	.	.	.	Buying Sales. Stores.
Services	.	.	.	Engineering. Transport.
Technical	.	.	.	Research Manager.

The importance of works accounting is sometimes lost sight of—perhaps in a maze of figures. The presentation of concise departmental costs with the minimum of delay is essential. Many useful statements become uninteresting if not useless through late presentation. Furthermore, it is now the function of the works accountant not only to present bare figures, but to suggest to the management his considered opinion as to what the figures reveal.

The importance of co-operation between departments cannot be too strongly stressed. As a matter of fact, only by “team work” and the “team spirit” throughout the enterprise can a business be thoroughly successful. It is important that each department should have knowledge

of all the other departments in order that difficulties and troubles may be fully appreciated on all sides.

Lack of co-operation or co-ordination between departments will very soon make itself apparent, and the executive will require to take immediate steps to remedy this state of affairs.

Any proposed change of policy, alteration in method of manufacture or other important feature should be immediately communicated to all concerned. There is sometimes a tendency in modern industry to withhold information, but this will always be found detrimental to the best interests of the concern, and possibly cause needless doubts and friction to arise.

Frequent conferences of departmental heads or sub-heads are advisable, even lunch-time meetings being helpful.

We will discuss later how the transport department should co-operate with the other departments. Although the transport department is, perhaps, a comparatively new adjunct to industry, nevertheless its success is, without doubt, entirely dependent on strict co-operation with other departments, and on the success of this co-operation depends the ultimate well-being of the industry as a whole.

The Need for a Transport Department in Modern Industrial Organizations.

Twenty years ago it was exceptional to find a transport department having a place in an industrial organization, while to-day one can hardly find a business of any magnitude which does not possess such a department, performing duties considered to be of just such importance as any other of the older established units. Not only in ordinary every-day industrial life is the transport expert encountered, but he is to be found as an adviser to city, county and urban councils, chambers of commerce and commercial associations of all descriptions. The functions of the traffic officer are becoming more and

more a necessity in the constant consideration of business problems.

In the United States the need for the traffic expert in business is realized to a much greater extent than in this country. Firms of very small ramifications find it expedient to employ a traffic manager if only to deal with rates matters alone. Furthermore, each town of importance in America has an organization—a Traffic Club—where all traffic men meet to discuss transport questions, these clubs also catering for the social needs of local transport men. In addition, there is an organization called the Associated Traffic Clubs of America which exists primarily for showing business men the need for adequate traffic departments in charge of competent men, and for the further education of those engaged in the transport profession. This association has recently induced the U.S. Department of Commerce to make a survey with a view to showing business men the advantage of having their traffic properly looked after.

In the field of railway rates, which is, perhaps, now more complicated than ever, not to speak of the need for expert advice in dealing with such matters as claims, demurrage, shipping, packing, internal transport, the working of road vehicles, and many other phases of transport, there can be no question of the appointment of a transport manager with an adequate staff being a sound economic proposition.

It has been pointed out to what extent the transportation expert is necessary at the beginning of things, as for instance, in the location of a factory. When this has been satisfactorily accomplished a transport department must be formed as part of the general organization. This department must be adequate to the first needs of the plant, and be placed under the charge of an executive head of equal status to other departmental managers.

There must be a clearly defined policy in regard to the transport manager's scope of control, and the transport officer must be clear as to his exact responsibilities. It

is the purpose of this treatise to endeavour to show where these responsibilities should begin and where they should end.

As to the economic reasons for the creation of a properly constituted transport department, it has already been suggested that railway companies' debits for carriage, demurrage, hire, etc., offer a wide field for investigation with consequent saving of expenditure. Proper methods of packing and means of transportation, routing, warehousing, internal movement, and handling, the correct classification of goods, the storing and handling of raw materials, and the organization of road transport, are only some of the heads under which the transport expert can usually effect astonishing economies.

Transport affects every business, however small, and industrial organizations cannot afford to ignore the need for a transport executive if economies are to be effected and competition boldly faced.

The effect of the Railways Act of 1921 on modern industry is now well known to all concerned. One thing, however, in particular, has emerged as a result of this revolution in methods of compiling railway rates and charges, and that is the extreme need for advice in interpreting the terms of the Act. Questions of "standard revenue," "traders' privileges," and the "securing of exceptional rates" are but a few of the phases requiring expert attention.

Dr. G. Lloyd Wilson in his work, *Traffic Management*,¹ tells us that the importance of the duties of the commercial and industrial traffic managers in America is coming to be appreciated not only by commerce and industry, but by the carriers as well. The railway and shipping companies welcome them as trained collaborators in the field of producing, selling and buying transportation on a fair basis to all concerned. "More and more clearly," Dr. Wilson says, "is it being impressed upon the Government, the Railroads and the Traders that their interests

¹ "*Traffic Management*," by G. Lloyd Wilson, Ph.D.

are really identical." Just as we hope is the case in this country, suspicion and hostility is giving place in the United States to a sense of mutual responsibility.

Whilst we have our Railways Act of 1921, the Americans have their Transportation Act of 1920. Both these measures provide, in effect, that rates are to be established on a basis sufficient to yield a reasonable remuneration for capital invested in efficiently managed railway undertakings.

"Shippers realize," says Dr. Wilson further, "that adequate service can be expected only at fair rates, and that the carriers can furnish transportation service only when they are reasonably compensated. Rates sufficient to attract adequate supplies of needed new capital, to the extent approved by the regulatory powers, must be established as compensation for efficient transportation service." Presumably this view is also held by traders in Great Britain, but, judging by recent events, it would appear that they are not yet satisfied as to the efficiency of railway administration. But what of the duties of the Traffic Manager? In America, "rule-of-thumb" methods are rapidly being dispensed with. The big commercial enterprise or industrial undertaking needs someone more gifted than a man with a knowledge of packing and consigning traffic and of checking freight charges. "To these rudimentary functions," asserts Dr. Wilson, "must be added the selection of routes over which freight is to move; the preparation and presentation of claims against the carriers for loss, damage, and overcharge; the analysis of classification ratings accorded to commodities bought and sold by the industry or commercial establishment; the analysis of rates paid by the industry, to determine their effect upon business; the obtaining of adequate car supply; the drawing-up of packing specifications to enable freight to be dispatched safely and economically; the organization and supervision of local transport service to and from freight depots, and the arrangements for internal factory working. They will further include a detailed

analysis of the sources of supply of raw materials and of the markets of the finished products, to determine whether the industry is obtaining the benefit of the lowest prices and rates on its inbound material, and taking advantage of the most favourable markets in which to distribute the industry's products."

All these functions, and many more, are the duties of the industrial traffic department. A further point brought out by Dr. Wilson in his most interesting and comprehensive treatise is the differentiation in the duties of the industrial and commercial traffic manager. Whereas the former attends to the transport interests of individual industrial concerns, the latter does so for commercial organizations, such as chambers of commerce, trade associations and community business organizations.

The operations of an association in Great Britain known as the Traders' Traffic Conference (which was incorporated in 1915), and of which most transport managers are members, are worthy of note.

Amongst other activities, the objects of this association are as follows—

1. To consider all questions connected with trade, commerce, and manufactures, and particularly to investigate all matters of railway and other traffic facilities, charges, and rates for, or in connection with them, and to deal with all such questions and matters in so far as they are of general application and not for the benefit of any individual or individuals only.

2. To consider, support, promote, or oppose legislative or other proposals affecting trade, commerce, manufactures, traffic facilities, charges, and rates.

3. To form, organize, manage, and represent associations of traders and others interested in trade, commerce or manufactures, traffic facilities, charges or rates, having their objects confined to all or any of the objects herein mentioned.

4. To support and defend the interests of the company or of any section of the community or general body of persons engaged in trade, manufacture, or commerce, before any commission, board, court or tribunal, or any public body or authority, and in particular to take any proceedings which may lawfully be taken under Section 7 of the Railway and Canal Traffic Act, 1888, and Section 78 of the Railways Act, 1921.

5. To advise and assist in all matters affecting any of the foregoing objects.

Meetings of the conference are held monthly at various industrial centres, in order that points of importance may receive careful consideration and to arrive at decisions on matters of principle.

It will, therefore, be seen that the successful operation of business cannot be contemplated without due recognition being given to the necessity for an expert on transport matters. No industrial concern can do without transportation of one kind or another, and with the evergrowing complications, whether in respect of legislation, charges, or service, there is the greater need for the creation and proper supervision of a transport department.

Relations Between Transport Department and Other Sections.

Co-operation and co-ordination are essential factors in business enterprise, and it is, no doubt, from these that rationalization has come into being.

Important as is the grouping of large industrial units in order to adjust production and consumption, just as important is the smooth working and fitting together of these units within themselves. Successful management is entirely dependent on the quality of the relations between all departments or sections of an industrial concern.

It follows, then, that the transport department is vitally concerned with the cordiality of these relations. After all, transport can be said to be the "Alpha and Omega" of industry. Raw materials must be brought from their source to where they are wanted; in the ground they are of no use to anyone. Again, the finished product must ultimately be delivered to the consumer, and delivered by the best and cheapest means.

Internally, all sections at one time or another require the use of transport, but, generally speaking, an effective link must be maintained between the transport organization and the buying, stores and sales groups. The transport manager himself must occupy an important place in the works' executive councils. Few deliberations take

place which do not involve matters of transport in one phase or another. It has been said that industry can be likened to a triangle, having one side representing manufacture, the other sales, with the base as transport. It needs no stretch of the imagination to conceive the amount of movement that takes place before the goods are delivered. It is often in movement that leakage and waste, with consequent loss of profits, occur.

In order that the transport department may function and serve, it is necessary that all information relative to inward material, shipments, sources of supply and special arrangements as to transport should be supplied immediately. Copies of advice notes, or the originals, should be sent to the traffic office as soon as possible after arrival, so that checking, setting and expediting can be carried out speedily.

Relationship with the stores section is especially important. The receipt, checking and distribution of stores usually involve constant planning and organization between the stores and transport sections. The engineering and maintenance departments must also depend to a large extent, in their functions of rectifying breakdowns, on the reliability of the internal transport system. Plant stoppages must be avoided at all costs, and quick repairs are dependent on close co-operation between engineering and transport.

"Sales," especially, interest the transport manager, and he should be fully conversant with the policy of his company in this respect, as well as being notified from time to time of any change or increase of markets. The transport officer's advice should be sought in all matters affecting distribution, warehousing or shipment. Matters concerning export should not be settled without submission to the transport department. In this direction, considerable economies are possible and orders may be secured in the face of keen competition.

"Purchasing" commands similar treatment. No contracts should be entered into until transport costs,

conditions and methods of delivery, shipping and landing arrangements, packing and other phases of transport in relation to buying have been approved. The many delivery methods and conditions, involving as they do, questions of f.o.b., f.o.r., and other terms, as well as rebates, full wagon loading, cartage from ships' side, all suggest the necessity for co-operation and the possibility of economies.

It should be realized by all sections of business that the transport manager's functions include, not only the actual arranging and execution of transport, but also that of adviser on all matters in which movement or transportation is involved or contemplated.

This point cannot be too strongly impressed on all who are vitally interested in the maintenance of the strength and in the growth of British industry to-day. Such a state of affairs can only be brought about through economy in production. Transportation costs figure much too largely in industry that they cannot afford to be overlooked, much less be ignored. Not only this, but the transport officer must be entirely free to act apart from any other departmental chiefs. He should be in a position to report directly to the managing director—if the organization is so arranged. Transportation's importance is such that straightforward conversations between the responsible transport officer and the heads of the industry must be made possible, be made frequently, and be made satisfactorily.

If the transport department is to function to the best advantage and be of full service to the concern which it serves, it must have the complete confidence and co-operation of all the other departments with which it comes into contact.

The Transport Manager's Scope of Control.

A good deal of difficulty exists to-day in determining where the duties of a transport manager begin and end. Many deep discussions have taken place on the subject,

but until now it has usually happened that individual organizations have adhered to their original ideas and acted accordingly. This is an unsatisfactory state of affairs, but, generally, the causes are not far to seek.

First of all, it is difficult to find an individual whose education and experience of transport matters are, of such width and depth as to enable him to undertake the manifold duties of a transport manager. Secondly, old customs are hard to break, and boards of directors and executives are loath to change systems which they, no doubt, say have worked at least satisfactorily for many years. Generally, such systems have meant that transport matters were relegated to various departments where, perhaps, they were carried on as mere sidelines to the usual departmental functions.

It has been shown to what extent the advice of the transport expert is of value and of importance in the initial negotiations concerning the location of the factory. Similarly, the transport manager is concerned with any contemplated extension, primarily as regards the actual proposed lay-out and, following that, the arrangements with reference to construction and the final transport or handling methods on completion.

The transport manager's control and concern should commence when the material has been ordered, and, in a word, end with the delivery of the finished product to the customer. This involves heavy responsibility and constant and watchful attention. Then comes the control, repair and maintenance of all means of transport belonging to the concern, coupled with the hiring or chartering of outside units, the regulation of raw materials, the delivery and unloading of goods at the required point within the factory, the ordering of wagons, the arrangement of shipments, packing, loading and stowage, the working of private wharves or docks, the arrangement of internal transport services and connections with railway companies' lines, routing and means of forwarding, questions affecting rates by rail and water, loss and delay,

claims, weighing, and the upkeep of internal roads and railways. In addition to this, the control and working of privately-owned wagons is an important part of transport work. Packing and loading involve consideration of the general railway classification, the use of containers, and the proper arrangement of mixed loads for transshipment at convenient transshipping stations.

It will be understood that businesses of different sizes require a transport department coinciding with the amount of tonnage imported and exported. In many cases no internal industrial working is involved, so that the transport manager is only concerned with the commercial aspect of transport management. On the other hand, large manufacturing plants require that the transport department shall deal with internal operations on a large scale involving the actual control of rail, road and shipping facilities, as well as conveyor and rope-way systems. In the commercial section, railway, shipping, receiving and export departments have to be supervised.

It follows, of course, that the transport head must be possessed of full knowledge of the working of the particular concern in which he is engaged. He should be aware of the methods of manufacture and to what extent the transport department is involved in any particular unit, especially drawing up a reserve plan in case of likely failure of either plant or transport means. The transport manager must also be fully conversant with the working of other departments of the industry, such as buying, sales, stores, engineering and maintenance, estimating and accounts sections. General manufacturing costs are important to the transport manager, and he must be made conversant with these as and when issued. Similarly, with knowledge of the working and conditions as affecting his own manufacturing organization, the traffic man must be fully alive to the facilities and executive personnel connected with railway, road, and shipping companies and, if necessary, air lines. All routing conditions, rates services and general information connected with

any means of transport must be in the hands of the traffic department. The traffic manager must be in a position to give immediate information as regards rates of freight, probable time involved in travelling, continental or foreign transport conditions, useful distributing centres abroad, road conditions and routes, traders' tickets, and passenger or steamboat services.

The securing or loss of important orders may depend on the cost of transportation, and the choice of route may seriously affect that cost. Before new contracts are entered into for the supply of raw materials such questions as cost of conveyance, service, stocking arrangements, shipping and landing facilities require to be submitted to the transport manager for his consideration, comments, and suggestions.

The selection of distributing points, with attendant warehousing and transport problems, are within the purview of the transport department.

Types of Transport Departments.

It follows that the magnitude and scope of a transport department must depend on the type of industry, and on the amount of business carried on. Industrial transport management can be definitely divided into three classes—firstly, the complete Transport Department involving commercial, operating, shipping and export sections; secondly, the Commercial Transport Department, where the firm does not itself manufacture, own, or operate its own forms of transport; thirdly, the Transport Department connected with public bodies, chambers of commerce, associations; or transport experts acting or practising in an advisory capacity.

So far as the first class is concerned, we will presume that a large manufacturing concern is involved with a large factory and an important export trade. Internal transport of all classes and a road fleet are operated, and private water craft is utilized. In this case the transport

department is divided, for practical purposes, into commercial and operating, each placed under the control of sub-officers possessing the training and experience to carry out satisfactorily their respective responsibilities.

The commercial department is sectionalized into railway, road, and shipping. It will, of course, depend on the extent of the business done as to the number of staff employed and their consequent duties. The railway section deals with all matters affecting the transport of goods by rail. This includes the quotation of rates to the buying and selling departments, the checking of carriage accounts, the consigning and advising of dispatched goods, expediting dispatch and receipt, claims, traders' tickets, siding and other agreements, and any other questions affecting railway transport. The road transport section is concerned with similar details such as rates and checking of accounts for hires, consigning and advising and delivery notes, as well as questions of damage or delay.

The commercial transport department is required to have a live knowledge of continental transport conditions, routes and rates. A general knowledge of foreign and colonial transport systems and ports, climatic conditions, and, within reason, the costs over the various transport systems in the districts where it is intended to arrange distribution centres overseas is also desirable.

These distribution centres are becoming more and more a feature of every-day business, and their full success can only be attained by their proper location and by the measure of the transport facilities emanating from them. The warehousing or storage facilities at these centres with, of course, the necessary transport and routes must be the subject of investigation and report by the transport manager.

Other phases of road transport work, apart from those already mentioned, should be covered by the operating officer, excepting perhaps the arrangement of licensing and insurance, which may be in the hands of the secretarial department.

The shipping department's responsibilities consist of arranging suitable freights and charters, insurances, and in dealing with bills of lading and customs formalities.

The operating section of the transport department may cover a wide field of responsibility, dependent, of course, on the means of transport employed externally and internally. In taking the extreme case we may have a large factory connected directly by rail, road and sea—with probabilities of air transport as well. Internally, railway and road movement, and other transport systems, are employed. In addition to the organization of these, the operating section should be responsible for the regulation of raw materials and for handling raw materials to and from stock. Maintenance of permanent way and roads, locomotives, rolling stock and road transport also comes within the scope of operation. The checking and unloading of inwards goods and the packing, loading, labelling and dispatching of the finished products are also involved, as is the responsibility for the "floating" gang. It is advisable to place "floating" labour under the charge of the traffic department for the reason that traffic fluctuations require to be met as they arise, and, consequently, sufficient men to meet contingencies must be carried. Calls for additional labour can usually be met from the "traffic" gang.

Generally speaking, the full responsibility for the expeditious and economical handling, receipt and dispatch of all material rests with the operating section of the transport department.

Now comes the transport expert who is appointed as an adviser to public bodies, chambers of commerce, etc., and is connected with transport matters outside individual industry or business. This class is not intended to include such officials as traffic managers of municipal tramways or of omnibus companies, but the representatives of industrial transport acting in the capacity of traffic advisers, and appointed by particular industries or associations to deal specifically with transport problems.

These transport officers perform good service in their various spheres, especially with regard to questions affecting railway rates and the Railways Act, 1921. Under such an arrangement, concerns operating in a small way and which are connected with these associations, can have the benefit of expert advice through the medium of the transport officer. Similarly, chambers of commerce are now finding that transport problems loom very largely in their discussions, and realize that expert advice in transport matters must not be overlooked. Some of the organizations referred to have appointed a transport committee with a traffic expert acting as secretary; while in other cases a small transport department has been created to deal with transport difficulties as they arise.

In some cases, individuals have set up private businesses for the purpose of dealing with rates or rebates, especially since the advent of the Railways Act, 1921, and no doubt these are doing useful work for small concerns which may care to make use of them. In most cases it is worth while having railway carriage accounts as well as debits for demurrage, wagon or sheet hire properly checked, as errors in the rates charged, calculations, weights, numbers of days chargeable and other discrepancies may be found. These various errors may show a surcharge by the railway company which more than covers the expense involved in checking.

Furthermore, we have the case of traffic experts or advisers appointed to positions under the Ministry of Transport or acting in the same capacity under the Transport Advisory Committee of the League of Nations.

The need, therefore, of higher education in the science of transport becomes increasingly apparent from year to year, and, no doubt, due cognizance of this fact will be taken by educational authorities throughout the country.

Relations with Railway Companies and Other Carriers.

If full success is to be achieved in the management of transport, it is essential that good relations should exist between traders and carriers.

In the case of railway companies, especially where no competition by rail is involved, it is absolutely necessary that the rank and file on both sides work amicably together and in the best interests of their respective companies. As a rule, it is found that local railway officials are to a great extent tied by numerous rules and regulations, and, consequently, are not in a position to give immediate decisions on transport matters in the same way as shipping companies or road transport concerns are able to do through their local agents.

Nevertheless, a great deal depends upon the individual, and, if the proper spirit exists, erstwhile difficulties are quickly overcome.

In the matter of the quotation of rates, railway carriers are at a disadvantage in not being in a position to quote special terms immediately in the same way as road hauliers invariably do. The latter very often offer their services where a return load is available, and, through the direct medium of the driver of the vehicle, quote extremely favourable rates.

The advent of the industrial transport department in business was at one time looked upon by many railway officials as a decided nuisance, in that far too many deductions were made from railway accounts, demurrage items were questioned, more claims were rendered, and a general hustle on the movement of goods introduced. Happily, a different viewpoint is now being taken by responsible railway managers. First of all it is realized that a transportation official who knows his business can be approached and can generally be relied upon to give a definite answer to any query immediately. It is usually found that the terminal-user standage of wagons with attendant demurrage charges is considerably reduced, thus

giving railway companies' rolling stock a quicker turn-round. Better and more economical loading of wagons results. Definite routing, proper classification and consigning follow. The best packing methods are utilized. Regular and definite train services are arranged, and adequate information of likely traffic is supplied beforehand, so that return train loads can be arranged. These are day-by-day items which the industrial transport manager and the railway companies' officials can, between them, deal with satisfactorily to the general benefit of trader and railway company alike.

Relations with shipping companies are, as a rule, maintained on a high level, due, no doubt, to the fact that the competition factor is much more prevalent than in the case of railway transport. Of course, coastwise and inland water routes often compete with railway services, although, perhaps, this fact is sometimes overlooked. Shipping companies usually meet their customers in a fairly generous spirit, and endeavour, as far as lies in their power, to quote acceptable rates and provide adequate services.

Competition among road transport companies is such to-day as to re-act favourably on the side of the trader, and, consequently, the "buyer" of road transport has little difficulty in keeping on good terms with the "sellers" of this means of conveyance.

The advent of air transport "solicitors" or "cavassers" is anticipated by business men. These representatives of air service companies may arrive at the door of the transport manager's office at no distant date.

CHAPTER III

THE TRANSPORT DEPARTMENT: COMMERCIAL SECTION

It is not the purpose of this volume to make more than passing reference to the question of rates for the conveyance of goods by rail as that matter stands to-day. The subject now requires especial study and treatment, and has already provided, and, no doubt, will continue to provide, scope for separate consideration.

Railway Rates.

The Railways Act, 1921, was revolutionary in character, and, although more than two years have elapsed since the introduction of the new classification and charges, it is safe to say that a much longer time will be required before really smooth working can be expected. Since the advent of railways, changes in methods of charging have taken place from time to time culminating in the Act of 1921. The "appointed day" under the Act was 1st January, 1928, and since that time most users of railway transport have become conversant with the new scheme of things. The general railway classification, previously covering classes of goods, viz. A, B, and C and from 1 to 5, now contains no fewer than 21 classes. The Act provides for the requisite rate books being available at all goods stations for inspection by the public without payment of fee. The following particulars are now included in the rate books—

1. The chargeable distance from that station or place of every place to which they book.
2. The scales of standard charges applicable to each class of merchandise conveyed on the railway.
3. All exceptional rates in operation from such station or place.
4. Any charges in force for the collection and delivery of merchandise at such station or place.

In addition to these, the general railway classification of goods is also available, but it is advisable in cases where goods are regularly conveyed by rail for the trader to secure a copy of the new classification (*Railway Clearing House*, price 2s. 6d.), and also to compile his own rate books either by arrangement with the railway company or, by degrees, from carriage accounts as traffic passes. A comprehensive review of the new classification is particularly advisable.

Previously, railway rate books contained the actual rate chargeable between any two points under the eight classes as well as exceptional rates in force. Now all standard rates have to be calculated from the schedules, distance being the predominating factor. Once the distance has been secured it is more or less an easy matter to make up the rates for the 21 classes.

Besides the cost of conveyance, the standard rates include station and service terminals, as, for instance, loading, unloading, covering and uncovering, but not the service of collection or delivery, for which an additional charge is made if performed by the railway company and, if the trader has been charged for services not performed, he can claim a rebate.

Drastic changes have taken place in respect of exceptional rates, and the trader would be well advised to study Sections 36 to 40 of the new Act. Generally speaking, operation of all exceptional rates had to cease at the end of 1927 with the proviso that exceptional rates had to cease at the end of 1927 if:

- (a) The new standard rate was lower;
- (b) the rate was less than 5 per cent or more than 40 per cent below the standard.

"Owners' risk" rates, previously carried under X, Y, and Z scales, also come under different conditions, traffic marked against categories ranging from "A" to "H" receiving percentage reductions ranging from 2½ to 12½ per cent.

The change in respect of cartage charges is an

improvement on the old method, as the charge is now only added to the rate when the service is actually performed by the railway company.

In the rate books available for public inspection, "carting" stations are "starred"; while the scale letter in the cartage scale column of the rate book gives the scale of charges applicable at the station.

Many complications have arisen as a result of the Railways Act, 1921, but traders are beginning to feel that gradually, as difficulties are surmounted, a degree of satisfaction will be evinced to the good of railway company and trader alike.

Rebates.

Rebates represent amounts which traders are legitimately entitled to recover from railway companies in respect of services charged and paid for (apart from overcharges), but which have not been performed. Rebates generally can be divided into two classes, viz. private siding working and cartage. In addition, the question of de-rating has also become of importance in that it is intended to give relief to depressed industries by means of rebates to be allowed on the carriage charges of certain specified traffics.

So far as private sidings are concerned, the Railways Act, 1921 (Section 61), provides that—

1. Until an agreement has been made, or the rates tribunal have determined any differences that may arise, between the railway company concerned and the owner of or any person using a private siding (in this section called the "siding owner") as to the sum payable (if any) for accommodation and services provided in connection with the siding, the following provisions shall apply—

(1) Where at the passing of this Act an agreement exists between a railway company (being a constituent or subsidiary company or a company which is liable to have applied to it a schedule of standard charges) and a siding owner, under which the siding owner pays either the whole of the station and service terminals or pays such terminals and is allowed a rebate upon a percentage basis, the agreement shall continue to operate for the period fixed by the agreement, and after the expiration of the agreement, or, if the agreement is terminable on notice, then from the

expiration of any notice given thereunder, the provisions of the agreement shall be deemed to remain in force notwithstanding any change which may be made in the amount of the terminal charges.

(2) Where at the passing of this Act an agreement exists between any such railway company and a siding owner whereby the siding owner pays for accommodation and services provided in connection with the delivery or collection of merchandise at the siding a fixed sum, or pays for such services terminal charges less a rebate of a fixed amount, the agreement shall continue to operate for the period fixed by the agreement, and after the expiration thereof, or, if the agreement is terminable on notice, then from the expiration of any notice given thereunder, the sum so payable or the rebate so allowed shall be increased in proportion to the amount by which the aggregate of the conveyance rate and station and service terminals may have been increased since the date of the agreement.

(3) Where at the passing of this Act there is no express agreement as to the amount to be paid for such services, but the siding owner in fact pays station terminals and service terminals or any portion thereof or either of them, the siding owner shall hereafter pay for such services as aforesaid the station terminals and service terminals or such portion of the same as he has heretofore paid.

(4) Where after the passing of this Act a new siding is connected with the railway, or traffic which is not provided for under the foregoing provisions of this section passes to an existing siding, the siding owner shall pay for the aforesaid services the amount of the station and service terminals for the time being in force; provided that the sum thereafter agreed or in default of agreement determined by the rates tribunal to be payable for such services shall be payable from the date of such connection for traffic or of the passing of the traffic as the case may be or for a period of twelve months from the date of application to the tribunal, whichever is shorter:

Provided that nothing contained in this section shall give rise to any presumption as to the value of the aforesaid accommodation and services, and in fixing any sum which the siding owner is to pay the rates tribunal shall have regard only to what sum is reasonable in all the circumstances of the case.

2. The Railway and Canal Commission shall not, after the passing of this Act, exercise any jurisdiction with respect to the matters to which this section relates

Amongst its many other powers of jurisdiction, the Railway Rates Tribunal has authority to determine questions brought before it in respect of: "The variation of any

toll payable by a trader," and " The amount to be allowed for any terminal services not performed at a station, or for accommodation and services in connection with a private siding not provided or performed at that siding."

As is generally known, it was previously the practice to charge rates which included collection and delivery charges, rebates being made as and when traders cared to apply for them. The 1921 Railways Act eliminates the need for the arrangement of rebates for cartage services not performed (except in the case of " C " and " D " Exceptional Rates, which are still liable to rebates). Section 49 of the Act provides that—

1. A railway company may collect and deliver by road any merchandise which is to be or has been carried by railway, and may make reasonable charges therefor in addition to the charges for carriage by railway, and shall publish in the rate book kept at the station where it undertakes the services of collection and delivery the charges in force for the collection and delivery of merchandise ordinarily collected and delivered.

2. Any such company may, and upon being required to do so and upon payment of the proper charges shall, at any place where the company holds itself out to collect and deliver merchandise, perform the services of collection and delivery in respect of such merchandise as is for the time being ordinarily collected and delivered by the company at that place:

Provided that the company shall not be required to make delivery to any person who is unwilling to enter into an agreement terminable by him on reasonable notice for the delivery by the company at the charges included in the rate book of the whole of his traffic, or the whole of his perishable traffic, from the station at which those charges apply.

3. Where any person does not so agree, the company shall not be required to deliver any of his merchandise, but, if such person fails to take delivery of any merchandise within a reasonable time, the company may deliver such merchandise and make such reasonable charges therefor as it thinks fit.

4. Any dispute as to whether or not any charge for the services of collection and delivery is reasonable, or whether the length of notice for the termination of an agreement under this section is reasonable, shall be determined by the rates tribunal.

The procedure for securing relief under the de-rating scheme was first of all dealt with under the Railway Freight Rebates (Anticipation) Scheme, which operated from 1st December, 1928, until 30th September, 1929,

which scheme has now been replaced by the Railway Freight Rebates Scheme, approved by the Railway Rates Tribunal, 9th July, 1929, under Section 136 and Schedule II of the Local Government Act, 1929 (H.M.S.O., price 5d. net).

The first part of the last named (which operates from 1st October, 1929) deals with the scheme submitted by the railway companies providing for the allowance of rebates from the carriage charges made by them in respect of selected traffics.

Reference is made to paragraph 13 of Part I of the Eleventh Schedule to the Local Government Act, 1929, which deals with the fund which will be set aside for the purpose of meeting claims for rebates under the Act. The question as to whether any rebate is allowable, or any dispute as to the basis of calculation, may be referred for decision to the Railway Rates Tribunal.

The First Schedule (Part I) gives details of agricultural selected traffics and the rebates allowed; Part II, coal, coke and patent fuel selected traffics; Part III, other selected traffics.

The Second Schedule (Part I) deals with rules for the determination of carriage charges and the calculation of rebates thereon; Part II details the general provisions as to allowance and calculation of rebates. In the latter connection special attention is called to the following—

So far as is reasonably practicable, separate accounts shall be rendered to the trader for the traffic in respect of which rebates are allowable under this scheme.

Accounts relating to traffic in respect of which rebates are allowable to a trader under this scheme shall be prepared in triplicate and shall show in a separate column the amount of the rebate so allowable.

Part III of Schedule Two makes special provisions for apportioning rebates in respect of certain mixed coal; Part IV is concerned with special provisions as to allowance and calculation of rebates in respect of exported coal shipped coastwise; Part V, provisions as to claiming and making payments out of the fund already

referred to. The Appendix to the scheme gives details of forms (eleven in number) which are to be used in connection with the Rebates Scheme as already dealt with.

Claims.

An important item in commercial transport management is the question of claims. Claims are more or less made from day to day in all concerns dealing with transport of any kind, and there is no doubt that a good deal of time and labour is expended in dealing with matters appertaining to claims rendered for loss and damage in transit. Within recent years the British railway companies have been doing all in their power to reduce claims by inducing their staff to handle goods more carefully, and it must be admitted that they have succeeded to a great extent in their efforts in this respect. On the other hand, it is the obvious duty of industrial firms to do all within their power to avoid claims by seeing that their goods are properly packed, consigned and loaded; and it is well that the transport manager should keep closely in touch with all the latest devices in regard to the better packing, loading and handling of his firm's products. It has to be borne in mind that the loss of time and labour involved in dealing with claims matters, as well as the additional work in re-ordering—with the possible hold up of urgent jobs in consequence, have all to be met without recompense.

Then it often happens that claims are disputed, and so become the cause of friction between the buyers of transport and the carriers. The railway companies require that for part loss, damage, delay, or mis-delivery they must be advised in writing within three days of the termination of transit. For non-delivery of the whole of a consignment or of any separate package forming part of a consignment, the conditions involve advice in writing within 14 days, and a claim rendered within 28 days after receipt of the consignment by the company to whom the same was handed by the sender.

Many claims are refused because of late notification, and generally all carriers' clauses necessitate immediate attention being called to any damage so that this can be inspected prior to a claim being rendered. It is of importance that shippers be fully conversant with all documents prepared, in order that the claimant may not find later that he is not covered in any particular case.

In the case of traffic moved by railway, the "Owner's Risk" consignment note may have been signed in order to take advantage of a cheaper rate of freight, and in this case, unless deliberate damage on the part of railway servants can be proved, no claim can be made.

Attention is drawn to the standard terms and conditions of carriage, settled October, 1927, by the Railway Rates Tribunal under Section 43 of the Railways Act, 1921, and published in accordance with Section 54 of the same Act. (H.M. Stationery Office, price 2s. 6d. net.) This is an important document and no transport manager can afford to ignore it. The first part of these terms and conditions of carriage lettered "A" deals with traffic carried by merchandise trains at "Company's Risk" rates. The necessary methods of addressing and consigning are detailed, and it is noted that the company shall, if required, sign a receipt for the goods. Such receipt cannot be taken as evidence of condition or of quantity or weight or nature as declared. Condition 2 of the first part outlines the method of labelling wagons dispatched for private sidings; conditions 3, 4, 5, and 8 define the liability of the railway companies; condition 6, consignment notes; condition 7, goods carried by rail and transferred to other means of transit.

The remaining conditions of Part I (numbering in all 28) deal generally with terms and conditions of carriage of merchandise when carried by merchandise trains at company's risk rates.

Conditions lettered "B" cover merchandise carried at owner's risk, whether in cases where so consigned or where the goods are accepted at owner's risk rate only.

Conditions lettered "C" deal with live stock (other than wild animals) when carried at company's risk rates, while conditions "D" outline the standard terms and conditions of similar traffic when conveyed at owner's risk rates.

Conditions lettered "E" deal with the carriage of damageable goods not properly protected by packing when carried at company's risk rates.

Conditions "F" cover the terms and conditions of carriage of coal, coke and patent fuel when conveyed by merchandise trains.

Further conditions deal with carriage of goods by passenger train, while regulations are also stated for the addressing of merchandise when carried both by merchandise and passenger trains.

In the case of goods carried by road, it is well that senders cover by insurance the liability of loss or damage, or insist that the road haulier signs an indemnity form accepting all risk of loss, damage or injury. Although road haulage has proved itself to be safe haulage, the risk of loss or damage, especially from fire, is never entirely absent.

It is intended to deal with claims arising on goods carried by sea in a later chapter, as matters such as marine insurance and general average are so closely allied to the general subject of "shipping by sea."

Claims constitute a real annoyance to carrier and trader alike. It therefore behoves carrying companies to do all that lies in their power to handle goods carefully, give good service, and avoid loss by pilferage or mis-delivery. Similarly, on the trader's side, it is necessary that in the first place the parties dealing with claims should have a particularly thorough knowledge of all rules and regulations governing the submission of claims for loss or damage occurring over any means of transit, so that unnecessary correspondence and labour may be eliminated. In addition to this, traders must see that goods are properly packed and loaded (when the latter service is performed by the sender), properly marked, labelled and

consigned, because only by giving strict attention to these points can traders hope to receive sympathetic consideration when legitimate claims do arise. It is, of course, an important part of the transport manager's responsibility in the interests of his firm to see that claims are rendered and pressed in all cases where it is just and lawful to do so.

Delays and Expediting of Traffic.

Whilst the selection of routes and routing of traffic require expert cognition in execution, a wide geographical knowledge is none the less essential in tracing shipments and expediting deliveries. So far as overseas imports and exports are concerned, close touch with shipping companies or shipping and forwarding agents will give, more or less, immediate information as to the position of shipments and the reason for any delay. In this respect the agents at the port of discharge or transfer will possess news of the ship's progress, and this information can be passed immediately to the home agents.

It is obvious that the knowledge of the routes covered by foreign railways must be reasonably thorough in order that goods passing by sea and rail may be expedited by the proper means without loss of time, similarly, with inland waterway routes abroad, since such routes are rapidly developing as a means of transport.

Delays occurring to consignments dispatched by coast-wise or inland water routes, roadway or air do not generally require to be followed up, as agents will notify shippers of any mishap or breakdown which may have happened, and which is likely to retard delivery.

It is helpful to the transport manager if he be aware of the usual methods and routes adopted by railways at home for the particular transit of his goods. As a rule, small consignments which are liable to be transhipped at one or more points and which are, perhaps, required to pass over different companies' lines are more likely to suffer delay than direct wagon loads. The latter can

usually be followed up as they generally pass by routine services and recognized routes. In fact, railway companies now give information to the trader as to the times taken between most points by traffic passing in full wagon loads. The companies also advise senders immediately of wagon breakdowns en route with further notice when repairs have been carried out and the wagon again dispatched. It does not always follow that, unless senders or receivers complain of delay or non-delivery, the railway companies make no effort to give reasonable service or trace immediately any consignments which may have gone astray. When a consignee, after inquiry, finds that his goods have not arrived, and that the likely receiving point has no knowledge of them, it is essential that he immediately communicate with the senders; this procedure is generally adopted because the sending point has full knowledge of the method and details of dispatch, such as route, wagon number, tranship points, and service.

In the case of urgent consignments, due advice given to the railway company will ensure the best service and a following-up throughout transit with proof of delivery supplied on accomplishment. In these days of active road transport competition, railway companies make every effort to ensure that traffic handed to them, whether specially advised as urgent or in the ordinary way of business, receives as expeditious a service as it is possible to arrange.

CHAPTER IV

THE TRANSPORT DEPARTMENT : SHIPPING AND RECEIPT OF TRAFFIC

IN many quarters it is not considered that the shipping or dispatch departments should come under the purview of the transport manager, but it is strongly urged that where a transport department is part of the general organization, the packing, handling, or movement of goods be made part of that department's responsibility. Much time and money can be lost through careless methods of packing and dispatching, and in cases where responsibility is divided, the best liaison and co-operation cannot quite make up for the direction of one executive.

The term " shipping " is sometimes misleading as being taken to apply only to goods shipped by sea or other waterway. This must be made clear. The shipping section of the transport department deals with the packing, loading, and dispatching of goods via rail, road, water, air, or parcel post. It is here that the intelligent buying of transport has to be carried out as well as the choice of means and route. These points are all important to industry to-day.

The Shipping or Despatch Department.

The shipping department may be divided into packing, weighing, loading and forwarding sections. In addition, sub-sections may deal with water, rail and road dispatches respectively, arranging freights, exceptional rail rates or hired cartage charges.

All the necessary documents in connection with the dispatch of goods are dealt with by the shipping department. Advices to consignees, consignment or dispatch notes, bills of lading, and other shipping documents, wagon labels and receipt notes for signature are indicated.

The best means of packing, including the use of containers, ought to be investigated by the shipping department; warehousing or staging goods at home or abroad; the arranging of shipments by sea; the proper marking, checking and weighing are also points dealt with by the shipping department.

Claims, delays, the tracing of goods forward, and assistance to the sales department in quoting, are additional responsibilities. It may be that the checking of forwarded rail or freight accounts can be dealt with also by the shipping or dispatch department, but this will greatly depend on the magnitude or arrangement of the transport department as a whole.

In any case the shipping department is much too closely allied to the transport department to be allowed to function separately, and it will be found that the best results are obtained when the shipping section is made part and parcel of the transport department and under the direct charge of the transport manager.

Consigning, Advising of Goods, and Labelling of Wagons.

The section of the transport department, which is responsible for consigning traffic dispatched by rail, plays no small part in the general scheme of successful transport management.

This function, as well as that of advising dispatch of goods to consignees, must be carried out promptly and properly in order that there be no delay in dispatch, and that the purchasers are made aware of the time and means of conveyance.

The Railways Act of 1921 has, perhaps, made the position as regards proper consigning more involved than it was hitherto, and close study of the conditions is therefore absolutely essential. It is, of course, generally understood that goods intended for dispatch by rail shall be accompanied by a consignment note on which shall be stated—

- (a) The full names and addresses of the sender and the consignee;
- (b) the station or place of destination;
- (c) such particulars as the company may reasonably require of the nature, weight (inclusive of packing) and number of the parcels, articles or merchandise handed to the company for carriage to enable them to calculate the charges therefor;
- (d) whether (when the company do not require prepayment) the charges are to be paid by the sender or by the consignee; and
- (e) where by arrangement with the company the merchandise is accepted "to wait order" at any particular station, that the consignment is "to wait order"

In addition to this, every truck loaded in a siding not belonging to the railway company must be labelled by the trader with two labels, one to be affixed on either side of the wagon and stating—

- (a) The name of the sender;
- (b) the name of the consignee (except where the truck is loaded with merchandise for more than one consignee);
- (c) the station or place of destination and where such station or place is served by more than one company the name of the delivering company;
- (d) the nature of the merchandise;
- (e) the actual weight, or where this is not practicable the approximate weight of the merchandise (inclusive of packing); and
- (f) the name of the owner and number of the truck.

Goods intended for conveyance partly by rail and partly by water require to be accompanied by a consignment note, signed by the sender, containing such terms and conditions applicable to the carriage of such merchandise by water as the company are entitled to impose.

In the case of goods to be carried at "owner's risk" rates, or goods which the railway companies carry at "owner's risk" only, besides being properly addressed, every consignment must be accompanied by a consignment note compiled as undernoted—

- (a) That the consignment is to be carried at "O.R." (Owner's Risk);
- (b) the full names and addresses of the sender and the consignee;
- (c) the station or place of destination;

(d) Such particulars as the railway company may reasonably require of the nature, weight (inclusive of packing), and number of the parcels, articles or merchandise handed to the company for carriage to enable them to calculate the charges therefor;

(e) whether (when the company do not require prepayment) the charges are to be paid by the sender or by the consignee; and

(f) where by arrangement with the company the merchandise is accepted "To wait order" at any particular station, that the consignment is "To wait order."

Similar conditions, as to the labelling of wagons from a private siding to those already stated, apply.

Special conditions as undernoted apply to the carriage of coal, coke and patent fuel. The consignment note must state—

(a) The full names and addresses of the sender and the consignee;

(b) the name of the colliery or point at which the fuel is tendered for conveyance;

(c) the station or place of destination, and where such station or place is served by more than one company the name of the delivering company, and in the case of through traffic, where practicable, the route by which the fuel is to be conveyed;

(d) the name and number painted on each truck;

(e) such particulars as the company may reasonably require of the nature and weight of the contents of each truck to enable them to calculate the charges therefor;

(f) where practicable the total weight of the consignment; and

(g) to whose account the charges are to be placed when the company do not require the carriage charges to be paid by the owners of the sending colliery or works.

So far as dangerous goods are concerned, the 1921 Act does not impose any obligation on the part of a railway company to accept dangerous goods for conveyance as set out in the Explosives Act, 1875, or any orders or bye-laws made under that Act.

Section 50 of the Railways Act, 1921, confirms that where dangerous goods are accepted for conveyance the carrying company are to be indemnified from and against any loss or damage which may result owing to non-compliance with the bye-laws, regulations, or conditions in force, and the trader is liable to pay full compensation

for injury and damage ensuing during conveyance, except in cases where it is proved that the railway company's servants have been guilty of misconduct.

Any question as to whether goods are dangerous has to be determined by the rates tribunal, and in cases where the railway company has declared any article to be dangerous the onus will be on the trader to prove otherwise.

Attention is called to the classification of Dangerous Goods by Merchandise Trains, dated January, 1928, in which reference is made to the Railway Companies' Public Notice and to the shipment of dangerous goods.

Dangerous goods not specified in the special classification are not accepted for conveyance, and the goods specified are only accepted in the packages and with the conditions named, while the railway companies will, in addition, not undertake the carriage of any dangerous goods except on special conditions signed by the sender or his representative.

Besides the conditions with which it is necessary to comply in regard to the consigning of different classes of traffics to be carried under varying terms, other points require to be borne in mind.

For instance, it is not necessary in all cases to make use of the official forms of consignment note, and many firms economically embody the making up of consignment note, advice to consignees, and even the wagon labels in one operation. This is usually accomplished through the medium of the typewriter, but a strong point in the preparation of a consignment note is the need for legibility, so that no dubiety may exist in the minds of the railway company's officials whose duty it is to check and invoice the traffic.

The correct description of the goods, in accordance with the general railway classifications, is necessary for two main reasons. The first is in order that the proper rates are charged, with the consequent avoidance of overcharges and deductions, and, secondly, so that there will be no infringement of the Railway Clauses Act in respect

of false declaration. The entering on the consignment note of the correct number of packages and weight also prevents a deal of future trouble through deductions in carriage accounts, whilst the prompt delivery of the goods depends on the correctness of wagon numbers and names and addresses of consignees.

In the latter connection, mistakes and delays often occur through the want of proper geographical knowledge on the part of the consigning clerks. For instance, there are many places in different parts of the country which bear similar names, such as Newport, or Newton, or Newtown, and it is advisable, therefore, to keep a hand-book of railway stations (which can be obtained through the Railway Clearing House, price 14s. post free) for ready reference. Railway companies are not liable for loss or delay due to inadequate or incorrect addressing or to imperfect labelling.

It should be definitely settled between buyers or sellers of goods at the time of contract as to who is responsible for carriage and cartage charges. If this important phase of business negotiation is omitted or neglected, a great deal of time is lost and unnecessary correspondence created. Certain regulations exist for the addressing of goods when carried by merchandise trains. These regulations are of such importance to traders that they are quoted at some length—

1. Each article or package shall (except as hereinafter provided) bear—

(a) The consignee's full name and address in legible and durable characters; or

(b) a legible and durable distinguishing mark with a label (on the letter-card principle) stating on the outside the name of the station or place of destination, and on the inside the name and address of the consignee;

(c) in the case of "Wait Order" traffic, a legible and durable distinguishing mark together with the name of the station or place of destination, and the full name and address of the person to whose order the article or package is sent;

(d) in the case of export traffic, a legible and durable distinguishing mark, together with the name of the port or dock of shipment, and the name of the ship or shipping agent.

2. Where a consignment of more than ten articles or packages of the same or of a similar description of merchandise is forwarded to the same consignee the following provisions may be adopted—

NUMBER OF ARTICLES OR PACKAGES

Eleven to 100: Not less than one article or package in every five shall be—

- (a) Addressed in accordance with Regulation 1 hereof; and
- (b) marked to show the total number of articles or packages forming the consignment, provided that a minimum number of ten articles or packages shall be addressed and marked as aforesaid in each consignment.

Over 100: Not less than one article or package in every ten shall be—

- (a) Addressed in accordance with Regulation 1 hereof; and
- (b) marked to show the total number of articles or packages forming the consignment, provided that a minimum number of twenty articles or packages shall be addressed and marked as aforesaid in each consignment.

Provided that where it is not possible for the trader to indicate the total number of packages forming a consignment to be dispatched by him, each part of the consignment when delivered to the company must be labelled in accordance with this regulation as if the same were a separate consignment.

3. Subject to Regulation 2 hereof, metal bars, rods, tubes, plates, sheets, forgings, castings, chains and any other similar merchandise shall have the addressing particulars as provided in Regulation 1 hereof conspicuously shown in legible and durable characters—

- (a) On wooden, metal or other durable tallies fastened to the merchandise by wire; or
- (b) painted, stencilled or otherwise legibly and durably specified on the merchandise.

Provided that bars, rods, tubes, and other articles which do not afford a suitable surface for painting or stencilling shall be securely bound into bundles convenient for handling, by wire, rope, or other material to which the company has given its approval in writing, and that such bundles shall have attached thereto tallies as provided by this Regulation.

4. Hides, skins, pelts, or other merchandise carried loose shall have labels, or wooden, metal, or other suitable tallies affixed, and addressed in accordance with Regulation 1 or 2 hereof.

5. Every label, tally, address, or mark shall be securely fastened or affixed to the article or package.

6. All old or conflicting labels or addresses shall be removed or entirely obliterated before the article is tendered for carriage.

7. These Regulations shall not apply to—

- (a) Returned empties, when legibly branded with the owner's name and address.
- (b) Merchandise for which the exclusive use of a wagon is provided by the company.

(c) Articles identical in all respects, or packages of uniform description and size containing merchandise identical in all respects, when such articles or packages are forwarded in consignments of 2 tons and upwards from one sender to one station or place of destination.

(d) Export and import merchandise conveyed in through trucks direct to ship and vice versa.

(e) Merchandise forwarded to Ireland, or the Continent of Europe, which is carried subject to special addressing regulations.

Routing and Selection of Transport Services.

The proper selection of the cheapest and most efficient means of transport best suited to the needs of his particular industry presents an important test of the skill and ingenuity of the transport manager. It is safe to say that the appointment of a transport officer to deal with this phase of transportation will, in all cases, more than justify itself, as the possibilities of saving money in this direction are unlimited. It is estimated that the selection of the most economical means of transport has resulted in saving as much as 5 per cent of a large all-in freight account.

The first essential must be strict co-operation between buying and sales departments and the transport section. There must be no hesitation in consulting the transport manager as to the means and routes of conveyance before contracts are finally fixed. Mention may be made here of what is known as "reciprocity" in the selection of a transport service. For instance, the railway companies may be large buyers of material from a particular firm or firms, and naturally it will be expected that preference be given to railway routes. In this respect the transport manager must be advised by the commercial manager of all the circumstances, so that proper recognition may be given in relation to the orders placed. It has to be borne in mind that there are limits to reciprocal schemes of the nature indicated, as, for instance, when additional cost is involved which may be out of all proportion to the profits made on the orders for material which have been placed by the transport company.

The field of transportation availability grows year by year. Sea, inland waterways, railways, highway, air, and the numerous mechanical methods for short-distance transport, such as ropeways, conveyors, pipe-lines, are all in the selection list. The accessibility of services, of course, means much. While coastwise shipment may be economical and sufficiently expeditious, its benefits are annulled if railway freight charges to the port are heavy. For the same reason the use of inland waterways may be ruled out.

In the shipment of goods abroad many factors require minute investigation and consideration. What are the facilities at the nearest port? Is there already a trade which attracts the best type of vessels? Will the advent of the new business attract shipping companies to that port? Freight rates and time may be deciding factors. Can fast liners be made use of, and the need for transshipment avoided? Are the vessels best suited for the carriage of the particular shipments involved? These are only a few of the points to be considered in connection with deep sea traffic.

Regular shipping lines are established over the world's main sea routes where there is a definite trade in all directions. In addition, there is a formidable amount of "tramp" tonnage on offer for any cargoes for any port. Shipping firms recognize certain trade divisions indicated as follows—

HOME TRADE. Between ports of the United Kingdom.

COASTING TRADE (apart from Home Trade). Between ports in the United Kingdom and ports in the Near Continent (Belgium, Holland, Germany, Northern France, Norway, Denmark).

BALTIC. United Kingdom to and from Denmark, Sweden, Finland, Russia, Germany.

SPAIN AND PORTUGAL. United Kingdom to and from Spain and Portugal.

MEDITERRANEAN. United Kingdom to and from Mediterranean.

BLACK SEA. United Kingdom to and from Black Sea.

INDIA AND FAR EAST. United Kingdom to and from India and Far East.

AUSTRALIA Australia to United Kingdom and Europe.

TRANSATLANTIC. America, North and South, to United

Kingdom and the Continent; West Coast to United Kingdom and the Continent via Panama.

TRANSPACIFIC. United States and Canada to and from the Far East.

World trade can be said to embody the exchange of raw materials, mineral and agricultural, for manufactured goods. Generally speaking, so far as Great Britain is concerned, we import raw materials and export manufactured goods.

As regards port facilities, the student is recommended for reference to the supplement of Lloyd's Register where such matters as dry docks, floating docks, pontoons, patent slipways, wet docks, tidal harbours, quays, etc., are dealt with comprehensively.

The trader, through his transport manager, has a wide selection of transport in dealing with inland shipments. In fact, all known means of movement are at his disposal—railway service or services, coastwise sea, inland waterways, rivers and canals, and air. As has already been stated, the problem of selection of transport means is vital in the interests of successful transport management, and can only be carried out successfully by the application of intelligence, experience and foresight on the part of the transport officer concerned.

What are the factors transcendent in this selection? They are cost, time, facilities at both ends, transfer arrangements, wagon supply, and minimum handling between manufacturer and buyer.

Cost and time questions can be immediately decided by consideration of the class of material, competitive rates and freights, and the urgency of deliveries. The matter of facilities is extremely important. Proximity of loading point, crannage, types of vehicles, methods of handling and risk of breakage or damage, internal rail and road arrangements at shippers' and receivers' factories are all involved. Warehousing may be contemplated, and this requires mature consideration as being affected by the ultimate distribution from the warehouse.

Terminal costs are often a formidable item when fully brought together, and may be the deciding factor in the selection of transport service.

We now come to the question of "routing" as applied to consignments destined for conveyance by rail. The railway companies have agreed schedules of routes for traffic over one company's lines or over the arising line, and one or more other companies' lines. Briefly, these schedules are framed so that, as far as possible, traffic will travel over the original company's system to an extreme point in favour of that system. This may not always be to the advantage of the trader from the point of view of expeditious transit. However, the trader has the option, within limits, of consigning his traffic over a particular railway route. (Attention is here drawn to Section 52 of the Railways Act, 1921.) Otherwise, his consignments are treated as "unconsigned," and are consequently dealt with by the railway companies as already indicated.

The advantages of competitive railway routes are, of course, obvious, in that a trader may, for reasons of his own, consign his traffic as far as possible past the forwarding company. On the other hand, in places where more than one company operate, greater advantages are in the hands of the trader in the selection of a route over rail.

Packing.

Of recent years there has been fairly rapid development in means of transport, but it must be said that even greater development has taken place in methods of packing.

This has probably resulted from the following important considerations, viz.—

The reduction of damage and pilferage.

The cost of packing.

The introduction of containers and saving in cost of transport.

The need to cover the cost of "returned empties"

has induced manufacturers in many cases to introduce cheap but effective packages which need not be returned. This is especially noticeable where wooden cases have been replaced by cardboard or fibreboard containers.

There is also a tendency to increase bulk loading for transit, as, for instance, milk in tank wagons, grain and fruit. Bulk loading of materials such as steel sheets is also finding favour.

The necessity for avoiding claims and possible friction between sellers and consumers makes the case for the introduction of absolutely efficient packing methods a vital one. The increase of bulk containers for the conveyance of such materials as groceries, confectionery, soap, fireclay, brittle goods and many other commodities, between factory and distribution warehouse or direct to consignees, has been of undoubted advantage to railway company and trader alike. There is little doubt that the container system is only in its infancy, and that the benefit of loading without packing can most certainly be greatly extended. The utility of the road transit furniture van, and the standard of excellence which has now been reached by removal firms in handling miscellaneous furniture, china and effects without breakage or damage of any kind, proves a strong case for the use of containers for rail conveyance.

There is increased scope for the container system for "less than container loads." In this direction a group of senders having traffic between similar points might collaborate by way of making up full container loads. Such an arrangement should easily result in reduced freight rates.

The General Railway Classification of Goods by Merchandise Trains contains certain regulations with reference to the packing of goods. These regulations should be carefully studied by all consignors. The question of packing in relation to rail charges must be taken into account, because it is obviously foolish to spend more in

packing in order to secure a lower rate if the extra cost of packing is more than the saving in rate.

In the case of mixed consignments, it has to be borne in mind that a package containing articles not all chargeable at the same rate is charged at the highest rate applicable to any of the articles. Other conditions affecting mixed consignments are dealt with in the General Railway Classification.

Although one type of packing may be sufficient for goods for home consumption, export conditions may necessitate the adoption of a different type of packing, either through the needs of shipping or of foreign transit. Weather conditions abroad may also influence packing methods.

Freight rates can be seriously affected by packing methods, in so far as a cargo which is chargeable on a measurement basis obviously must be packed as compactly as possible in order to secure the lowest rates.

There is ample scope for research into methods of packing. The standardization of packing methods will eventually mean economy in the cost of distribution, and after all the cost of distribution is a vital factor in industry to-day.

Loading.

In order to ensure that loading will be carried out with due care and efficiency, it is necessary that careful consideration be given to the lay-out and equipment of loading points. The class of goods handled and, of course, the means of transit to be employed will determine the nature of the loading plant which will be best suited to all requirements.

If the loading point is rail-fed it is advisable to introduce mechanical means of movement—apart from locomotive power—as, for instance, capstans, in order to obviate delays and to allow of a quick and cheap method of handling wagons. It is most important that the rate of loading should not be interfered with through waiting on wagons.

It is difficult to lay down hard and fast rules for loading berths for road vehicles. The type of material involved will be the deciding factor both in the type of loading shed and loading methods. Obviously, the lay-out and equipment which will give the best results by ensuring the speedy turn-round of vehicles is most to be desired.

Loading may also be carried on direct to inland water transport and even to sea-going vessels, but this generally involves the introduction of conveyor or other mechanical systems from loading point to vessel's side.

Packing and loading go hand-in-hand, but there is inevitably a link between them which must be forged. The class of materials dealt with will be the deciding factor as to what extent man power can be eliminated and suitable mechanical means employed. Obviously, bulk materials or heavy commodities like iron and steel can be loaded without recourse to hand labour, except, perhaps, the actual securing of the load. Apart from these, taking into consideration goods which must be packed, it is usually necessary to transfer the packed material to the loading berth and thereafter load by crane, hand or shutes on to road vehicles, railway wagon or ship as the case may be.

An essential part of loading is quickness combined with care and accurate checking. Loading gangs should be specially selected, and the supervision should be of a high order. If necessary, introduce a bonus system, which will tend to better results all round. Confusion or congestion of benches or at weighing machines must be avoided, and every step must be taken to avoid the double handling of goods.

Loading supervisors must possess, especially in the case of loading for rail transit, considerable knowledge of rail-loading conditions and restrictions, apart from any instructions issued by the shipping office. This refers, for instance, to the use of non-common user wagons, transfer points for combined loads, the use of suitable packing, sheeting of wagons, etc. Light loading should be obviated

as far as possible as tending to keep down shunting and unnecessary haulage.

Loading is really an art, and only long experience can ensure that the best results are obtained. Let us repeat the essentials. They are these: care, speed, the best use and speedy clearance of vehicles—road and rail—stowing and bracing of awkward loads, and, last, but not least, the avoidance of congestion and double handling at loading platforms and berths.

Receiving, Setting, and Unloading.

When goods have been delivered into the private siding by the railway company, important services have still to be performed before the traffic is deposited in the stores or warehouse or wherever required in the factory. The first essential in this direction is that the transport department has previous advice of the dispatch of the goods. This can be done by the commercial or buying department passing advices or copies of these immediately they are received to the traffic department. This refers to traffic in full wagon loads only. The advices will contain details of the goods, marks and weight, the wagon number and setting point. In cases where goods are carted to and loaded at a goods station, senders should be asked to supply the number of the wagon into which the goods have been loaded to allow of proper connection of the consignment being made at the receiving end. It is essential that along with the advices details of the delivery point in the factory should be given.

If this procedure is carried out, the traffic department will be able to deal immediately with the goods on arrival. For the information of shunters, a "works" wagon label should be affixed to each wagon after its arrival, showing the delivery point. An allocated locomotive will thereupon deliver the wagon at the proper setting point. Wagons containing "tranships" or sundry loads of stores will usually be delivered direct to the stores warehouse, no previous advice being necessary in such cases.

After the wagons have been delivered at the setting points they have still to be checked and off-loaded. In order to avoid congestion and demurrage charges, discharging should be arranged at the earliest moment after the setting of the wagon has been accomplished.

Discharging will be carried out by the traffic department cranes or off-loading gang as necessary, the goods being checked during discharge, breakages or deficiencies being immediately notified to the railway company. Advice of setting should be notified to the foreman in charge of off-loading, showing date and time the wagon is due out. Similar advice should be sent to any other parties who may be responsible for the discharge of special lots. Wagons will be discharged in the stores warehouse by the stores department personnel.

The prompt handling of incoming goods has a favourable reaction in that congestion is avoided, demurrage charges eliminated, and the material is delivered on site with the least possible delay.

CHAPTER V

WORKS TRANSPORT MANAGEMENT

A WORKS' transport organization depends initially for its success on the method adopted in the internal handling of wagons received or dispatched. It is generally found, in practice, that works transport has to meet fluctuations and emergencies, perhaps to a greater extent than in any other branch of the transport industry. It is difficult to draw up a programme of work which can be rigidly adhered to from day to day. In factories of any magnitude, full ship loads of material received or dispatched may have to be dealt with on short notice, plant breakdowns, or variation in manufacture have to be taken into account, while additional engine power may be required to be turned out to cover sudden rushes of traffic generally. Light engine running and the most economical use of engines present problems to the traffic officer which he must combat according to the special circumstances and conditions obtaining in the particular line of manufacture with which he is connected. Strong cases may be presented to the executive authority where alterations in internal railway lay-out, or additional capital expended on other improvements, may mean reductions in supervision and in cost of haulage.

Traffic Control and Operation.

The first essential is the provision of equipment in the way of locomotives and rolling stock of suitable calibre and condition to handle the traffic satisfactorily and efficiently. In addition to this, the internal permanent way must be maintained in good order, so that delays caused by derailments are reduced to an absolute minimum.

The days of second-hand factory equipment are over. Locomotives of a selected type must be provided and maintained in thorough condition. A programme of

reliefs for the carrying through of heavy and running repairs, tubing, washing-out, and cleaning must be drawn up and adhered to.

It is generally realized by traffic managers that engines out of service are unproductive and represent an important item of idle capital. Again, intensive supervision is necessary in order to see that the maximum use is made of engines actually on service. The time which engines are required to stand "waiting" or "under repairs" should be reduced to an absolute minimum.

It is suggested that in order to obtain the most economical result from locomotives working, engines should be manned over as long a period as possible. For instance, a three eight-hour shift system is better than a two or one shift arrangement. This means that three crews are necessary, relieving each other at the end of eight-hour tours of duty. It has to be borne in mind that the continuous use of engines has a marked effect on the amount of repairs, especially as regards the boiler and firebox, inasmuch as continual cooling down and heating up are detrimental to the fireboxes, tubes and stays.

In addition to this, there are other advantages in respect of continual running. For instance, lighting-up staff can be reduced to a minimum, while the saving in coal required for this purpose and the loss of fuel through drawing fires can be eliminated. The stock of engines, including a reserve for repairs or breakdowns, can be kept at a minimum and the best types maintained in service.

Internal rolling stock in sufficient quantity to meet all demands, and of types best suited to the requirements of the plant, are essential conditions. Similarly, as with locomotives, the wagons must be maintained in proper running order, and steps should be taken to see that wagons are not abused during shunting operations or through overloading.

Many systems are adopted for the control of traffic within a factory. The main essential in this respect is

that loaded wagons which arrive are checked and set at the point of unloading without delay, that loading plants are kept going with a supply of empty wagons, and that loaded wagons are cleared to the outgoing yard as a matter of routine. Reception sidings must be kept sufficiently cleared in order to avoid delay to incoming trains, and factory congestion should be avoided at all costs. Close touch must be maintained with the railway company or companies in order to ensure that outgoing traffic is moved within a reasonable time.

The system of control must, of course, depend on the volume of traffic to be handled, and will vary with the special needs of the manufacturing plant concerned. A small and compactly built factory may be served by the traffic department much more economically and efficiently than a large straggling set of plants which may involve long detours and haulages.

It is important that, as far as possible, engines be allocated to particular duties, such as the attention required at plants or on plant maintenance, on distribution of incoming material, private wharves, or in any sphere where locomotives are consistently required. The reasons for this are that less supervision is necessary, and that allocated engine crews will generally be found to take a livelier interest in the working of the plants with which they are concerned, and, in general, can be relied upon to give effect to efficient service. Engines employed on general work call for intensive supervision, and proper means should be adopted in order to get the most from them. Obviously, it is useless to rely on verbal orders given to locomotive crews by persons outside the traffic department, and it is therefore suggested that some sort of written order, signed or initialed by a responsible official, be issued to the traffic department before shunting work is carried out. This movement or shunting order should show date and time issued, nature of work to be undertaken, details of debit or job number, and space should be left at the bottom of the order for details

to be entered by the traffic foreman concerned of date and time the work was carried out, by what means, the time taken and/or particulars of any delay and signature. The advantages of such an order are that a programme of work can be made up for each engine as nearly as possible in the same area, delays in carrying out work can be immediately followed up, and a proper system of costing introduced. It would not be necessary to issue orders for all movement of traffic—as routine work, such as the normal arrival and setting of wagons, would be carried out as a matter of course—but for internal movement, the setting of internal wagons for loading or discharging, or for special maintenance requirements, a written order is a necessity. In exceptional or urgent circumstances a telephone message may be confirmed later by an order.

For the purposes of traffic control within a factory, there is little doubt that telephonic communication is a necessary adjunct to satisfactory working. It is advisable to divide the factory into sections, areas or plants, and place these sections under the charge of responsible traffic foremen, who, in turn, will be responsible to a chief foreman or controller. If the shift system is in operation in the works, it may be necessary to appoint assistant foremen who will work in accordance with the locomotive roster which will, no doubt, require to cover a 24-hour day in three shifts. An hour-by-hour picture of the traffic position should be in the hands of the chief traffic foreman or controller, who, in turn, will keep the traffic manager in touch with the situation verbally, by means of a log book, or by daily reports. The arrangement of locomotive crews, the lighting up and relief of engines for repair, week-end arrangements, special calls for locomotive power, accidents or derailments should be the responsibility of the chief traffic controller. The need for a proper telephone service has already been stressed. This telephone system should allow of constant touch being maintained by all sections of the traffic department,

so that the various foremen may be in close communication with each other and with their chief. In addition to this, all branches and departments of the factory which are interested in transport must be connected by telephone. If engine hours are to be saved, there should be no stint in providing ample means of telephonic communication throughout the whole area of locomotive movement. It is by means of constant touch with all concerned that the light running of engines can best be eliminated and economical working achieved.

Regulation of Traffic.

The regulation of all incoming traffic must be in the hands of the transport department. In the case of raw materials, arrangements should be made whereby plant fluctuations are met and dealt with by the transport manager, who will arrange to lift from, or put to, stock, as is immediately necessary. It follows, of course, that the handling of materials to and from stock at any time is best made the responsibility of the transport manager, the reason for this being that transport is so vitally concerned in matters affecting deliveries, the discharge of wagons, demurrage, and the feeding of plants by rail. In addition to the foregoing, traffic supervision is generally available at all times.

Furthermore, it is essential that any communications regarding the dispatch, expediting, and delivery of traffic between the trader and the railway companies should be made through the medium of the works' transport department.

It is, therefore, necessary that plant consumptions and details of all contracts be in the hands of the transport manager, who, in conjunction with the buying or commercial section, can then make all the necessary arrangements as far as possible for an even flow and delivery.

In cases where plants are run continuously, a programme of regulation in order to cater for week-end consumption is a necessity. As a rule, railway companies do not deliver

traffic during Sundays, and it is therefore incumbent that the stock of raw material, especially fuel, be built up throughout the week culminating in a sufficient supply on Saturday afternoon to keep the plant running until deliveries start on Monday. Ample siding accommodation should be provided in order to meet this arrangement.

A daily return should be placed before the transport manager containing details of raw material standage in the following form—

Date.

Classes of raw material.

Standing yesterday.

Received.

Tipped.

Standing to-day.

As the approximate tonnages must be worked up from the average carrying capacity of different types of railway wagons containing the various materials, columns showing the wagons by classes separately must be allowed for.

A more complete return would contain, in addition to the particulars already suggested, the daily consumption of each commodity, the amount dispatched yesterday, and the amount ordered to be dispatched to-day.

So far as the regulation of general traffic is concerned, special arrangements may require to be made, and a daily rate of delivery made with the railway company, as in the case of heavy import shipments, in accordance with the anticipated rate of discharge.

Any special large lots should be advised to the transport manager, so that the necessary arrangements can be made for expeditious handling and quick discharge on arrival. It should be left to the transport manager to use his influence with the railway company in the case of urgent consignments, in order that the best service may be given to the traffic.

The secret of the successful regulation of traffic lies in complete co-operation between the buying and consuming

units of the factory with the transport department, in order that there may not be the slightest hitch in keeping all the manufacturing plants running at the desired capacity.

Signalling and Level Crossing Arrangements.

In certain factory areas where a considerable amount of movement of traffic takes place, and where internal railways and roads are intermixed, certain safety precautions must be taken in order to eliminate, as far as possible, the risk of accident.

The Locomotive Factory Act Regulations provide for the protection of all works level crossings by the shunter and by warning whistles from the locomotive; but in certain circumstances, where only one shunter is allocated to an engine, the delay to locomotives through carrying out the necessary regulations in regard to level crossings, is such as to warrant the appointment of an additional shunter in order to expedite movement. In other cases where a busy level crossing is involved, regular level-crossing keepers may be necessary.

The use of up-to-date daylight signalling apparatus is strongly advocated at busy internal works crossings. The lights can be operated by rail contact or by the shunter when the crossing is to be fouled. Similar safety arrangements are necessary at blind corners or at difficult or dangerous shunting points.

In unduly scattered plants where a large railway system has been laid out with perhaps private branch railways leading into the main factory from wharves, collieries or docks, it may be an economical proposition to introduce a proper mechanical signalling system in order to allow of regular single line working and to facilitate traffic in the works generally. This signalling system will, of course, be proportionate in size and style to the nature of the plant railways and the amount of traffic moving. For instance, at important interworks junctions, signal boxes and signals may be erected and manned over the number of eight hour shifts required for traffic. On the

other hand, small ground frames at important points throughout the railway system might be quite effective. In the majority of factories, however, reliance is placed on the locomotive and locomotive crane crews, in so far as they are required to keep a sufficiently watchful eye during movement in order to avoid accident or collision. Nevertheless, this is not sufficient, and a local code of working rules should be drawn up showing, in the first place, in which direction traffic is to have preference, with details of passing points and how these have to be used. Instructions should be given to the men with regard to the action to be taken in case of accident or derailment, and some skeleton scheme is necessary which will become operative in case of fog. Steps must be taken to ensure that all works engines are fitted with head, tail and gauge lamps, properly trimmed and filled for night working.

The lighting of reception or dispatch sidings and lines over which shunting takes place should be such as to ensure safe working and assist shunters in carrying out their duties satisfactorily. Adequate lighting at coaling and watering points is also important.

The safe working of railway transport within factories depends to a very large extent on the type of men employed and the training they have received. Shunting work in factories differs entirely from similar work on railway systems, and, on the whole, calls for more intensive care and speed in operation.

Derailments and Accidents.

It is necessary that provision should be made beforehand for the possible necessity of re-railing locomotives or rolling stock within the factory area.

Where a large number of engines is employed, certain equipment must always be at hand, and, if possible, a breakdown van or wagon should be fitted out for the purpose, and equipped as under—

Ramps.

Hydraulic and screw jacks.

Packing of various sorts.
Lamps, detonators, bars, hammers, etc.
Rail and wheel gauge.
Wire ropes and slings.
Snatch blocks and tackle.

A heavy locomotive crane should be allocated to this duty, and trained slingers or riggers available to deal with derailments on short notice. Practical locomotive men can usually be relied upon to deal with ordinary wagon derailments either by means of ramps or packing found locally.

A register of equipment supplied to the breakdown van should be kept posted in the vehicle. Hydraulic jacks must be regularly inspected and kept in good working order, and the other gear maintained in quantity and quality.

It is often found that derailments have caused damage to the permanent way, and where accidents occur during the hours when platelayers are off duty, arrangements must be made whereby platelayers can be called out on short notice.

Care must be taken during re-railing not to cause damage either to rolling stock or permanent way, and to see that the loading capacity of the crane and equipment are not overstressed. All cranes should have the load capacities at the different radii plainly painted on them. For heavy lifts the extension girders, rail clips and packing blocks should be made use of.

In small plants where one or two engines only are employed, it is sometimes left to the engineering department to arrange to deal with derailments. In this connection it is suggested that a pre-arranged programme be agreed, so that unnecessary delays may be avoided. It is necessary also that all men employed in the traffic department should know how to act in case of emergency, and encouragement should be given to the men to take up "first aid" and ambulance courses, so as to be able to render assistance in case of accident to personnel, and to act quickly and correctly in case of collision or derailment.

Working Rules.

Where many locomotives are employed within the precincts of a factory, it is advisable to draw up a code of rules for drivers and shunters, and issue a copy to each man concerned. It has already been suggested that locomotive working within a factory calls for constant vigilance on the part of the traffic staff, and it is well that every man concerned should be aware of any special precautions or local conditions which may exist calling for especial care. The Factory Act Regulations pertaining to locomotive working may be embodied in the rule book with an explanatory remark against each regulation. Times of leaving the shed, time allowed for meals, for coaling and watering and drawing fires, the amount of oil and waste allowed per engine shift, in accordance with the type of engine and cleaning arrangements, should be shown.

The steps to be taken in case of accident or derailment, the reporting of damage to wagons, the recording or reporting of delays or locomotive failure or weakness in permanent way, level crossing and signalling, the use of lamps, code of whistles, fog arrangements, instructions regarding weighing, and the movement of wagons by capstan or gradient should also be incorporated. It may be advisable also to embody general factory rules regarding time-keeping, sickness, holidays, etc.

An important item in any working rules is a code of whistles. In order to help to create a uniform system the following are suggested—

STARTING OFF. One long and one short blast.

STOPPING. Two short blasts.

PROPELLING BACK-OVER. Four short blasts.

REQUIRING TO WEIGH. Four long blasts.

TRAIN TO COME ON. Three long blasts.

BREAK-AWAY. Continuous short blasts.

APPROACHING LEVEL CROSSING. Long Blast.

Special provision should be made in respect of instructions to drivers of road vehicles embodying rules of

safety first, care of vehicles, garaging, petrol consumption or any other points of local or immediate interest.

Crane Working.

It is generally found convenient for locomotive cranes, namely, cranes which work over ordinary permanent way, to be under the control of the traffic operator. Cranes of this description used in construction or maintenance purposes will require, of course, to conform to the engineer's instructions when actually working under these conditions, but when travelling, all cranes must comply with the instructions of the traffic foremen on duty.

Locomotive cranes not utilized for particular plant purposes or under the aforementioned conditions should come under the charge of the transport manager for administration. The manning and maintenance of the cranes should also be the responsibility of the transport manager. Locomotive cranes will be used mainly for the purpose of loading and discharging, for re-railing, and in dealing with accidents. So far as manning is concerned, it is necessary in addition to the crane operator to supply a man for triggering and protection as well as for shifting points, or for any light shunting or movement.

During loading and discharging operations, competent slingers must be supplied in order to carry out the duties of fixing slings and equipment generally. In the handling of raw materials, suitable grabs for attachment to the crane are generally used. Where grabs are not convenient, tubs or skips which require to be hand-filled are utilized.

Crane efficiency depends to a very large extent on the handling of the machine by the driver, and it is therefore suggested that care be taken in the selection of suitable men for this purpose.

Cranes may be of types from 1 ton capacity upwards. It is a wise precaution, when selecting cranes of the heavier types, to see that the tare weight is distributed over more than two axles. Serious damage is often caused

to permanent way through two-axled cranes dealing with heavy loads on one spot.

Shunting locomotives fitted with a crane up to 7 tons capacity are useful machines for handling plant break-downs, and for the purpose of transporting pieces of machinery to and from the workshops, while light petrol electric road cranes are of service for general utility work throughout the factory.

The tendency to-day is to replace man power by mechanical equipment, and in this connection the locomotive crane can well be considered an efficient and economical proposition. For instance, as a result of the advent of portable magnet cranes for use in the handling of pig iron or scrap, very considerable economies were effected in the handling of such materials, whilst the saving in time was also very important.

The fitting of caterpillar wheels to cranes utilized in the handling of raw materials is advantageous in the case of storage, and allows of freer movement and the greater use of jib span.

In the laying of new permanent way, light locomotive cranes are invaluable as saving time and labour, and in many other phases of material handling the use of locomotive cranes can be considered well worth while.

The “ Floating ” Gang.

In works of any magnitude it is generally found necessary to employ a gang of labourers for general works purposes. There is usually a sudden call for small lots of men to be supplied to plants on short notice, and these require to be available from the “ floating ” gang. Casual labour cannot always be obtained from outside at short notice.

The transport manager must have immediately under his control a yard gang mainly for loading or unloading purposes, apart from the squads required for the maintenance of permanent way, which should be sufficiently elastic so that emergency calls may be drawn from it.

There is usually a sufficiency of work in a factory, such as cleaning up and salvaging, apart from the regular duties of loading or discharging railway wagons, road vehicles or ships, to keep a labouring gang in steady employment, and when calls are made for small lots of men, or sudden traffic fluctuations arise, certain work can be left over. In other words, there should always be a "stand-by job" available.

It is suggested that the "floating" gang can best be made the responsibility of the transport manager for the reason that a traffic gang is necessary in any case, and it is uneconomical to distribute small gangs of men over the factory under various controls where regularity of employment cannot be certain. Again, casual labour is not always satisfactory, and it is pointed out that the transport manager can be relied upon to find work for the men, and to see that the strength of the squad is kept within reasonable limits and consistent with the average number of calls made upon it.

Special and Exceptional Loads.

To many traffic men the handling and arranging of special and exceptional loads are of great interest and instruction, and probably few laymen realize, seeing these loads en route, or after they have safely reached their destination, how much care and anxiety are experienced by those responsible for safe transit. Naturally, many factors arise in connection with the arrangements for transit of exceptional loads, as, for instance, the necessity for minute care and inspection before the railway company will even agree to carry such loads on account of the many restrictions governing different railway gauges.

In the first place, the particular nature of the load itself has to be considered, as regards weight and equal distribution, when placed on the rail wagon. To achieve this, much packing is frequently necessary, and should the load be of such a nature as to demand relief from too great a concentration at any one point on the wagon, a cantilever

arrangement may be adopted. This arrangement is general only in such cases as large press hammer blocks, etc., where the load is so abnormally solid in nature that it allows little possibility of even distribution.

It is usual with abnormal loads to submit a plan to the local railway company giving all dimensions, weight and destination. The railway company will, after inspecting and checking, submit the plan or copy to the various railway companies concerned in the transit for their inspection and approval.

Assuming the load can be accepted by the other companies, the local company arranges for a suitable wagon for conveyance, and presents a plan showing the particular method of loading and the number of packing chains and screws necessary for its safety in travelling.

Great care must be exercised in loading in order to see that good sound packing is used, well tied and clamped where necessary, and also that the chains and screws are so placed that there is no danger of these being found to be out of gauge when finally inspected. Should the load itself be one "out of gauge," then in all probability special working arrangements will require to be made by all the railway companies concerned for travelling at week-ends, or as is found to be possible through ordinary traffic.

Obviously, such a case demands much detailed arrangement on the part of the railway companies to enable an effective time table to be followed, and so ensure the load reaching its final destination according to programme and without mishap.

Sometimes a job is deliberately loaded more out of gauge on one side than on the other, in order to pass safely platforms, obstructions, bridges, signal cabins, etc. Again, the load may require to be placed in such a way on the wagon as will allow of easy transhipping or unloading should cranes of the necessary lifting capacities not be available, or in order that the wagon may negotiate curves or enter particular buildings at the receiving point.

There is little doubt that great pains are taken by the combined railway companies to-day to provide the trader with every facility in the way of special wagon equipment for abnormal loads, and apart, probably, from minor troubles, such as bearings running hot occasionally on a long run, most reliable and efficient service is rendered to the trader in this particular branch of rail transport.

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CHAPTER VI

CONTROL AND WORKING OF WAGONS

THE responsibility for the daily supply of a sufficient number of empty wagons for loading is an important function of the transport department. This responsibility involves two important considerations; firstly, how many incoming loaded wagons can be utilized for outward loads; secondly, to what extent and in what regularity can the supply of empty wagons be relied upon.

Wagon Supply.

In the first case, it should be known each morning approximately how many suitable empty wagons will be "made" during the ensuing twenty-four hours. The balance necessary will require to be ordered from the railway company, twenty-four hours notice usually being given. Orders may be placed by telephone, but require to be confirmed in writing. The confirmatory order should state name of firm, date, number of wagons required for the next twenty-four hours—a separate column on the order being kept for each class of vehicle generally used.

For exceptional, or out-of-gauge loads, necessitating the use of vehicles of a special class, full details and dimensions of the load as well as the name of the receiving station must be stated, and in some instances longer notice than twenty-four hours given.

Where the output of a factory is more or less regular, weekly notification to the transport department as a matter of form would be sufficient, but where there is daily fluctuation more frequent advice is necessary. Orders for the movement of special loads will be sent as required.

The ordering of wagons requires a knowledge of the various types of railway companies' vehicles, as well as

the operation of the companies' "non-common user" arrangements. These arrangements entail that certain special class wagons cannot be used for outward loads when not destined for a station or siding on the owning companies' line. The demurrage regulations involving short loading time on empty wagons ordered also mitigate against any over-ordering, and generally enforce the need for expert treatment by a trained transport administrator.

Details of the non-common user arrangement as at present in force are as follows—

LIST OF FOREIGN NON-COMMON USER WAGONS

All foreign wagons exceeding 12 tons carrying capacity are excluded from common user except L.M.S. end door and pig iron wagons of less than 20 tons carrying capacity.

All wagons belonging to the following railway companies are also excluded—

Bishops Castle.
Felixstowe Dock and Railway.
Manchester Ship Canal.

The following is a list of all other *foreign wagons* of up to and including 12 tons carrying capacity *not authorized for common user—*

OPEN WAGONS

All companies' wagons fitted with automatic brake or pipe.

All companies' cask wagons (spurred sides).

All companies' deal wagons (flat tops).

All companies' hopper bottomed wagons.

All companies' plate and rail wagons not fitted with bolsters.

All companies' tube wagons.

All companies' twin wagons not fitted with bolsters.

All companies' wagons specially constructed for the conveyance of—

1. Articles of exceptional dimensions or weight.
2. Traffic on wheels.
3. Coke.

All companies' service vehicles such as ballast, rail, locomotive, coal, stores, etc.

G.W. vehicles lettered "Match Truck."

COVERED VANS

All companies' vans fitted with automatic brake or pipe, and the following whether fitted or unfitted—

Gunpowder vans.
Meat vans.
Refrigerator vans.
Insulated vans.
Banana vans.

CATTLE TRUCKS

G.W. cattle trucks whether fitted or unfitted.

BOLSTER WAGONS

G.W. bolster wagons of any type.

All companies' double bolster wagons.

All companies' bolster wagons with six or eight wheels.

L.M.S. bolster wagons lettered "Not in Common User."

To enable non-common user wagons to be more easily identified, the following indications are being placed on the wagons as they pass through the shops—

(a) G W NON-COMMON USER WAGONS. A small plate lettered "Not in Common User."

(b) L.N.E., L.M.S. AND SOUTHERN NON-COMMON USER WAGONS (*except service vehicles and mineral hopper wagons*). A white letter "N" at each end of the headstocks, in the case of wagons with wooden underframes; or at each end of the bottom plank at both sides of the wagon in the case of wagons with steel underframes or curved headstocks.

Number-taking and Checking.

It is necessary, where factories are connected by private siding to the main railway system, that information be obtained relative to the arrival and handing over of traffic conveyed by rail. In the case of incoming wagons the details should be as follows—

Date and time of arrival.

Owner and number of truck.

Sending point.

Contents.

In some cases details are also taken of date on sender's or sending station's label, weight, if shown, whether sheeted, and, if so, number of sheet, particulars of packing, and a remark if the wagon bears a "repair" label.

Outgoing wagons should be recorded as they are placed

at the disposal of the railway company, and, if it is considered necessary, a record should also be taken of the time of dispatch, so that future controversy with the railway company may be avoided in case of any question arising of delay to the traffic. Similar details as indicated for received traffic should be made for outgoing traffic with, of course, the receiving station instead of the sending point, and, perhaps, the addition of the consignee's name.

Except in very special circumstances, wagons bearing "repair" labels must not be loaded out, but handed back empty to the railway company. It is not necessary to record the movement of outgoing empty wagons, although it is sometimes found advisable to do so for demurrage and statistical purposes.

In the case of received traffic, the checker may affix a label for demurrage purposes indicating the date the wagon is "due out." These labels, which should be of a distinctive colour, should bear the words "Due Out," and below a large number (from 1 to 31) which can easily be seen by the shunters and other persons concerned. When the wagon arrives back at the exchange point these labels can be collected, and, if made of a strong paper or cardboard, used again and again. Arrangements may also be made whereby the checker retains one of the sender's or sending point's labels, and places labels on the wagons indicating to shunters the point of setting.

The manner of checking wagons will, of course, vary with the size of the factory concerned and the number of railway wagons dealt with. In cases where a large turnover of wagons takes place, a special number-taking staff, in relation to the amount of traffic and the ground to be covered, will be appointed. In other cases the recording may be carried out as the wagons pass over the weighbridge.

In order that demurrage debits may be properly checked and steps taken to see that wagons are discharged or loaded promptly, a daily check of all railway companies'

wagons standing in the factory sidings is necessary. The information so obtained is thereupon transferred in the traffic office to record sheets or books. Sheets held by loose binders are, perhaps, of the greatest utility, although they must, of necessity, be voluminous in view of the fact that the numbers of the various railway companies' wagons now run into six figures. Indicating tabs from 1,000 upwards are useful for the purpose of separating the sheets into lots.

When number-taking is carried out on a fairly large scale, the numbers should first be taken on loose sheets at the points of arrival and dispatch, and the information thereafter transferred to proper wagon journals, headed as already indicated. Immediate advice should be sent to the parties responsible for discharge of the wagons, so that no time is lost in this direction and the vehicles promptly turned out empty or set for outward loads.

It is suggested that a proper system of wagon recording is a sound economical proposition giving to traders an independent check on railway companies' rolling stock, and avoiding factory congestion by allowing for a complete picture of the traffic position being in the hands of the responsible traffic official in the factory.

Demurrage.

Demurrage charges on railway companies' wagons often present a problem to the transport manager in so far as, in a factory of any dimensions, it is difficult to keep these costs at a minimum consistent with economical traffic handling.

The charges which are liable to be incurred, with particulars of free times, are as follows—

	For each day after the expiration of the free period
	s. d.
ORDINARY WAGONS	3 -
HIGH CAPACITY WAGONS—	
Exceeding 16 and not exceeding 20 tons	4 -
Exceeding 20 and not exceeding 30 tons	6 -
Exceeding 30 tons	10 -

	For each day after the expiration of the free period
SPECIALLY CONSTRUCTED WAGONS—	s. d.
Above 15 and under 20 tons	6 —
20 tons and under 30 tons	12 —
30 tons and above	20 —
REFRIGERATOR AND INSULATED VANS	12 —
SHEETS	— 6

FREE PERIODS

(a) WAGONS SUPPLIED EMPTY FOR LOADING.

At Stations. Wagons to be loaded and tendered to railway company for conveyance within *one day*, exclusive of the day on which the wagon is placed at the trader's disposal.

At Private Sidings, Docks and Wharves. Wagons to be loaded and tendered to railway company for conveyance within *two days*, exclusive of the day on which the wagon is placed at the trader's disposal.

(b) LOADED WAGONS AFTER CONVEYANCE.

(1) *At Stations.* Wagons to be unloaded within *two days*, exclusive of the day of receipt by the trader of notice of arrival.

(2) *At Ports (Shipment Traffic Only).* Wagons to be unloaded and placed at railway company's disposal within *four days*, exclusive of the day of arrival.

(3) *At Private Sidings, Docks and Wharves.* Wagons to be unloaded and placed at railway company's disposal, if empty, within *three days*, or if reloaded, within *five days*, exclusive in either case of the day on which the wagon is placed at the trader's disposal.

(c) REFRIGERATOR VANS AND INSULATED VANS. One day, exclusive of the day of arrival.

(d) SHEETS. The same free periods apply as for wagons

Apart from any question of legal consideration it is, of course, understood that traders load or discharge railway companies' vehicles promptly, and it is no doubt in the best interests of the trader to do so, in that a quicker turn-round of wagons means a greater sufficiency of rolling stock to meet all normal demands. Under the demurrage regulations, certain free times are allowed, and it is often suggested that it would be better for all concerned if what is known as a terminal user basis or average were agreed to. This terminal user basis represents the average time which all wagons stand in private sidings, and it is often argued that it would be fair to the trader to make

a charge, after an agreement has been reached, if a reasonable average has been exceeded.

However, local conditions vary to a considerable extent, and it would be a difficult matter to arrange an average which would be satisfactory to all. For instance, the L. & N.E.R. (the old North Eastern section) has a system of regulation of mineral traffic, and, in view of the railway company having this authority, no demurrage is charged on wagons conveying such material.

The regulations are worked on the basis of the consumption of raw materials in the factory concerned, and traffic is allowed to come forward as required, the stand-age working up from Monday to Saturday, keeping in view the need for an increased amount of traffic over the week-end—in cases where week-ends are worked in the factory, but NOT worked in mines or by the railway company over that period.

Demurrage charges are seldom welcomed by the trader, while the railway companies would very much rather have the use of their wagons than render demurrage accounts. It is therefore in the best interests of all concerned to see that wagons are discharged or loaded out as promptly as possible.

Private Wagons and Hire.

At the present time keen controversy exists as to whether privately-owned wagons should continue to be allowed to run on British railways.

Private wagons can be divided into two classes—

1. Wagons run over main lines.
2. Wagons for internal works traffic.

In the first case the majority of privately-owned wagons are used in the conveyance of coal traffic. In addition, private wagons may be utilized for the conveyance of such commodities as bulk grain or tarred slag, while numerous rail tanks are privately owned. Concessions in conveyance rate are generally allowed in cases where private wagons are used.

The fact is sometimes lost sight of that in the early

development of railways traders were induced to provide their own wagons. At a later day companies sprung into being for the purpose of hiring wagons to colliery companies, and to-day such companies occupy an important position in British industry. It was stated by the Royal Commission on the Coal Industry (1925) that of 700,000 coal wagons in Great Britain, 520,000 were privately owned, while 69 per cent of the coal carried in 1924 was carried in privately-owned wagons. In this connection an important point to remember is that in the area of the old North Eastern Railway Co., practically all mineral traffic is carried in railway-owned vehicles, as is also the coal from the Kent coal-fields.

Although evidence before the Royal Commission showed that the average turn-round of mineral wagons in this country was particularly low, being somewhere in the region of two round trips per month, it has to be borne in mind that the main argument in favour of privately-owned wagons is that the colliery companies can, under these circumstances, store coal in the wagons either "waiting orders" or "waiting shipping instructions," and so keep the pits going and the men in steady employment.

The advocates of the "no private wagon" policy apparently base their case on a "shunting saving." With regard to this point, it is sometimes overlooked that varying colliery districts and shipping points require different classes of mineral wagons. For instance, coal staithes in the North East Coast require the use of "hopper" bottom trucks, while coal shipping in Scotland is carried out by means of end-door wagons.

Shunting presents no difficulty as regards privately-owned wagons in the export coal trade, as these wagons are usually worked to and from the ports in full train loads. Again, mineral wagons are not suitable for general traffic—railway companies keep the goods and mineral classes of wagons separate as far as possible—and all classes of mineral wagons require to be worked back to colliery districts.

Wagons, other than for coal or coke traffic, are sometimes privately owned. It is essential in certain cases that traders should possess their own tank wagons for the conveyance of dangerous acids, and in this connection allowances in respect of service terminals can be claimed from the standard rate.

It is necessary for the firm operating private wagons to evolve a scheme for the proper recording of movement. There is no standard method of accomplishing this. Where a large number of wagons is involved, tables of movement can be compiled from day to day giving full details of dispatch, return, and repairs. In some cases, pre-paid, post cards are sent to receivers asking them to record the date and time of receipt, unloading and dispatch in respect of each vehicle. Another method is to record the position of each wagon by means of a coloured disc, placed on a board below the number, varying coloured discs representing whether empty, loaded, en route, or under repair.

Regulations regarding private wagons, both as regards standards and upkeep, are issued by the Railway Clearing House from time to time.

Many traders hire wagons from rolling stock firms on a yearly, monthly, or even weekly basis, the owning firm usually being responsible for repairs. Contracts can also be entered into with wagon-repairing firms, who have repair depots at all important marshalling yards throughout the country, for the carrying out of running repairs at any point of breakdown.

High Capacity Wagons.

The question of the introduction of wagons of higher capacity in this country has long provided subject matter for letters to editors and subsequent press comment. There is much to be said in favour of both sides of the question. Custom dies hard, and short-distance hauls and sundry loads cannot be eliminated. In the past, plants have been built to deal with wagons of low capacity—the permanent way, weighbridges, gantries, hoists,

locomotives and haulage gear within the factories all having been arranged accordingly. The same state of affairs exists at many collieries, any change in wagon tare weight or structure involving complete reconstruction of colliery buildings above ground. On the other hand, new plants are being laid out in order to meet the general tendency towards heavier rolling stock, and this is all to the good. Many factories, using a large amount of fuel, could well make use of larger than 20-ton capacity wagons to advantage, and in some cases traders have built 30-ton and 40-ton capacity vehicles for the conveyance of their fuel traffic. Unfortunately, colliery companies are not, at the present time, in a sufficiently flourishing position, financially, to enable them to recondition their plants to deal with wagons of, say, 50-ton capacity. Again, while traders may be prepared to build their own heavy vehicles the railway companies may not be inclined to offer any inducement in the way of a reduction in freight rate.

There is no reason why we should think in terms of a 20-ton standard fuel wagon; when general improvement in trade takes place and financial and other considerations permit, the standard coal wagon should at least be of 40 tons carrying capacity.

In fairness to the British railway companies it must be stated that, apart from wagons of special class constructed to carry exceptional loads, they favour the adoption of high capacity wagons where the traffic warrants. As an instance of this, 50-ton wagons convey the London brick traffic, and 40-ton coal wagons have been in use for many years on Tyneside, while more than 25 years ago the old Caledonian Railway Company introduced 30-ton capacity steel locomotive coal wagons, some of which were later utilized for the conveyance of sundry goods traffic between important points.

Internal Rolling Stock.

It is necessary in many factories to utilize a large number of wagons of different types for the conveyance of

inter-works material. These wagons are selected with due regard to the special needs of the industry concerned. Apart from wagons of special class, a certain amount of rolling stock may be necessary for inter-works traffic.

The most important point in the operation of works wagons is the turn-round. There is a tendency in plants to make use of rolling stock for warehousing purposes which, from a transport point of view, is uneconomical as tending to congestion and the inflating of the stock of wagons. Overloading of works wagons should be definitely forbidden.

There must, at the same time, be a sufficient stock of wagons to cover every-day requirements, in order to avoid the necessity of using locomotive power in shunting out individual wagons, and to avoid delay in carrying out movements.

A daily check of internal wagons must be taken, and records kept of the number of days each wagon stands empty or under load. Advice of wagons under load should be sent to responsible parties, and the traffic controller or foreman notified of empty stock available and of the necessary movement of loaded wagons.

In cases of emergency it is usually possible, by arrangement, to hire wagons from the railway company. These will be charged for on a day to day basis at the same rates as charged for demurrage in relation to the particular type of vehicle utilized.

Damage to Railway Companies' Wagons.

Industrial plants handling a large number of railway companies' wagons are often faced with claims for damage to rolling stock, due to accident, derailment or shunting work generally, within the works area. In addition to this, damage to wagons may occur during unloading operations, especially where cranes of the "magnet" type are made use of for the discharge of such materials as scrap, pig iron, ingots, blooms, etc. Damage may be also inadvertently caused to wagons during

loading operations when magnet cranes are used for this purpose.

As a rule, the railway company concerned arranges for the inspection of all wagons on arrival at a private siding, with another when the wagons are turned out either loaded or empty. Such an inspection generally serves to check any damage which may occur to the wagons whilst in the traders' hands, but it is, of course, open to the trader to make his own inspection in order to make certain that all debits made for damage to rolling stock are of a legitimate character.

If wagons are found by the railway company's inspector to be damaged on arrival a "repair" ticket is affixed, and it is then necessary for the works' people to turn the wagon out empty.

Should a wagon be turned out in a damaged condition, opportunity should be given to the trader to have the vehicle inspected and to disclaim or acknowledge responsibility as the case may be. The trader, if he cares, can repair the wagon or leave it to the railway company to do so. In acknowledging damage, attention should be called to any weakness in the wagon structure due to wear and tear, and an appropriate allowance claimed.

In cases where a loaded wagon is turned out from the works and found to be damaged, but does not bear a "repair" label, if the damage is serious, or is likely to affect the running of the vehicle, it may be necessary to have the load transferred.

Where serious or heavy damage to rolling stock takes place within the factory area, the trader will be called upon to load up the damaged vehicle and hand it over to the railway company for transit to the nearest repair shops.

Should an internal derailment take place, the cause of which is thought to be due to a defect in a railway company's vehicle, application should at once be made for an immediate inspection by an official of the carriage and wagon department of the railway company.

Proper records of damage to wagons should be kept by the trader, as there may be delay in rendering the account or advice of damage by a company not immediately concerned.

Handling of Railway Companies' Sheets, Ropes, and Packing.

In private siding agreements, traders are sometimes responsible for the return of all sheets, ropes and packing which may arrive in the factory covering or securing loads. In this connection it is necessary that an organized arrangement be made whereby the sheets, ropes and packing are collected and returned. Where sheets or ropes are required for outward loads, these will be retained and made use of with the exception of damaged articles, which will require to be returned to a repairing point.

Where the railway company arranges for the collection of sheets throughout the works, the trader is expected to give every facility to the railway company's staff in carrying out the work.

The railway company gives instructions as to the disposal of the sheets and packing. Defective sheets are required to be kept separate for transit to the sheet repair warehouse.

A record of packing delivered into a private siding, belonging either to the railway company or senders of the traffic, is handed to the trader simultaneously with the traffic so that the material can be carefully collected and returned.

Outgoing loads sometimes require the use of packing for security, which can be had from the railway company on application. On the other hand, the trader may provide the necessary packing, which will be returned free by the railway company after delivery has been effected.

Weighing.

It can be said with a very large degree of certainty that every industrial organization is interested to some

extent in the question of weighing. Again, the weighing of goods must be accurately performed for at least one very good reason, and that is that one cannot, under penalty, charge a customer for more than he is getting, or, unless under special arrangement, charge for more than the amount or weight actually delivered.

The introduction within recent years of new and speedier methods of weighing has been generally beneficial, and it is safe to say that weighing machine makers can be relied upon to cater for the needs of all and every form of industry involving manifold types of materials and products—finished or unfinished.

The old types of beam machines are being rapidly replaced by machines of the automatic type. These can be introduced to weigh materials during the process of handling, as, for instance, passing by conveyor or being dealt with by crane, thus giving effect to considerable time saving.

A great deal of weighing is required to be done by rail weighbridges, and this method usually concerns the transport manager to a very large extent, for the reason that the transport department is responsible for the control and administration of the weighing section, which will further involve the responsibility for accuracy in weighing.

The first essential in wagon weighing is the choice of site and lay-out of the weighbridge. The size and capacity of the machine having been settled, the site should be chosen with due regard to the avoidance of shunting or long haulage. Access to the weighbridge should be without curve or gradient nearer than 200 yds. on either side. The provision of a loop is necessary in order to keep running traffic off the weighbridge. Notices should be posted on either side of the weighbridge, restricting traffic passing over it to a speed not exceeding 4 miles per hour.

The weighing of bulk raw materials, or the taring of empty wagons, is sometimes carried out when the trains are on the move. The necessity for strict accuracy will

determine whether this procedure should be followed, although weighing on the move when carried out, owing to the need for speeding up traffic, can be performed with good results. This is especially so if the weighbridge is of the automatic or self-indicating type. The introduction of this class of machine will allow of wagons passing slowly over, the weight being clearly indicated on the quadrant or dial indicator. On the other hand, if time allows, or if expensive commodities are involved, each wagon should be stopped on the weighbridge with couplings left loose at either end and buffer free, in order to ensure complete accuracy.

Where one or more wagon weighbridges are available, it is advisable to arrange for these to be tested against each other every day by means of a heavily loaded wagon. It is possible to make slight adjustments on each machine, but if it is found that there is a serious discrepancy, arrangements should be made for overhaul, followed by inspection by the local Inspector of Weights and Measures. In any case, periodical tests by means of test-weights should be carried out with inspection and stamping by the inspector at least once in six months. Test-weights should also be sent for testing and stamping periodically. In connection with testing, the following points should be noted—

Weighing instruments of the vibrating type should be tested for error by ascertaining the weight in excess or deficiency (if any) required to bring the beam or steelyard of the machine to a horizontal position when fully loaded.

Weighing instruments of the accelerating type should be tested for error by ascertaining the weight required, when the machine is fully loaded, just to keep the beam or steelyard in a horizontal position on its stop or carrier, and no more; and should be further tested by ascertaining the weight required to bring back the beam or steelyard from its position of greatest displacement to the horizontal position, the machine being fully loaded and truly balanced.

When a railway company, a colliery, or other owner provides weights of an approved form, sufficient for testing their machines, such weights may be used by the Inspector of Weights and Measures, provided that he has satisfied himself as to their accuracy by verifying them on an approved weighing instrument by comparison with working standards.

The owner or user should, if required, provide sufficient weight of material for testing the machine above one ton, and should afford the inspector reasonable assistance in lifting the testing weights. In a vibrating weighing machine, if the balance is correct and the sliding poise at zero, the steelyard should, when repeatedly brought to its lower or upper stop and then released, always return to the horizontal position of rest. If the machine is provided with a dial and not with a steelyard, the machine is balanced if the index always points to zero when there is no load on the platform. An accelerating machine is balanced when the steelyard on being brought to a horizontal position on its lower stop or carrier will, on being released, gently rise to the full extent of its movement. In testing large weighbridges for weighing loads in motion, it is sufficient to carry out the tests with stationary loads.

The selection of weighers is an important matter, and a good deal of experience is necessary before complete reliability can be attained. Careful reading of the beam or indicator cannot be too strongly stressed. Where absolute accuracy is essential, check-weighing, that is, weighing over two or more machines, should be carried out. The records kept can roughly be divided into three classes, viz.

Inward traffic.

Outward traffic.

Internal traffic.

These may be sub-divided into classes, such as fuel or miscellaneous goods, with a special tareing register.

The form of the records should be: date, time, wagon

owner and number, from or to, contents, gross, actual tare, painted tare, net weight. Practice as to the taring of empty wagons differs according to the nature of the commodities handled. For instance, it may be necessary to tare empty wagons received for loading out, or, on the other hand, to tare out all empty wagons where absolutely accurate checking of invoice weights is held to be desirable. Where weighers are not constantly employed in carrying out their legitimate duties, such work as number taking or recording, consigning or advising, or other traffic duties of a clerical nature may be relegated to them.

Weighbridges should be kept clean, the table being thoroughly swept daily, or more often, whilst the beam and inside parts ought to be kept oiled and polished.

Variation in weighing is bound to occur, and it is quite possible for weather conditions to be responsible for differences up to 1 per cent. Certain allowances, sometimes known as "tolerance," are often made between senders and receivers in respect of certain traffics, such as wet fuel, in respect of water or shrinkage. In particular cases, invoiced weights are supplied to the weighers in order that wagons may be checked or re-weighed in case of shortage. In cases of shortages in material such as scrap iron, where the traffic may have passed through the hands of several agents, the wagons are sometimes held until the shortage is acknowledged and credit allowed. In such cases arrangements must be made between parties for the responsibility for any demurrage charges incurred.

CHAPTER VII

INDUSTRIAL TRANSPORT : GENERAL QUESTIONS

THE control of labour in a transport department usually presents more complications than the similar responsibility, in other sections of industry. This is due to the fact that, whereas in a manufacturing department one type of labour is employed, or if not one type, one class of workers connected with one trade union, in the transport department different classes of labour may involve several trade unions, and, as a rule, different conditions and rates.

For instance, industrial transport may include railway workers (as distinct from main line railways), road transport men, dockers, seamen, general labourers, engineers, electricians, boilermakers, and quite a number of other grades. In some cases the employees in the transport department may accept the same rates and conditions, and be under the control of the same trades union as the other workers in the factory. On the other hand, the transport men may require conditions according to the circumstances and means under which they are employed. Difficulties, however, are bound to arise in cases where, for instance, locomotive men under the same transport head are working under different conditions of employment, perhaps in the same factory. It can be realized that varying rates of pay, overtime rates, week-end time, all make for complication in working and for loss of efficiency and economy.

Staff and Control of Labour.

The transport officer must, therefore, be fully aware of all trade conditions, agreements, and rates of pay which affect his department. Close liaison with the labour department, where such a department exists, is essential. A well-thought-out arrangement of promotions, and

encouragement to the workpeople by means of sound piece work rates, bonuses or efficiency pay is worthy of attention.

In this connection it has been argued that bonuses are in the long run uneconomic as they are the cause of industrial fatigue, but, if the rate has been fixed with due consideration, the incentive given to the worker and the benefit obtained by the firm are surely material. Take the case of an expensive machine which, although worked mechanically, has to be kept going or fed by manual labour. There can be little doubt that, in such a case, piece work or bonus rates should be introduced. Bonuses save the cost of supervision.

Another point in transport work is that occasionally men are required to undertake work of a peculiarly dirty nature. This refers especially to loading or unloading gangs. In such circumstances, "dirty" money is sometimes paid as a special recompense for the bad conditions, and for the especial wear entailed on boots and clothing.

The question of the supply of certain articles of clothing to transport men often confronts industrial concerns. Railway companies supply their employees with uniform and waterproof clothing, and, as a rule, firms employing locomotive men usually follow the railway companies' example to a certain extent. It is really advisable, at least, to make an issue to drivers and shunters, once per annum, of waterproof coats and leggings with, perhaps, the addition of uniform caps. The work on factory locomotives is intensive, and calls for continuous attention and movement throughout all kinds of weather. Certain classes of labour can be booked off during inclement weather conditions, but the internal transport service must be carried on in order to keep manufacturing plants in steady operation.

The selection of staff and workmen requires a good deal of careful attention. The experienced manager usually scores in this direction, as only by long usage in the

picking of satisfactory labour can the best results be achieved.

In addition, it is vital that the relationship existing between the employees of the transport department, and the responsible managerial officials and supervisory staff, should be of a cordial character. If men have a grievance they should immediately make it known, and have the matter investigated at once. There is a tendency for workpeople to continue to work under some dissatisfaction or supposed grievance with the result that the consequent bad feeling grows rather than diminishes.

The "personal touch" is still possible by managers and subordinates, even although the directors of large limited liability companies are not in a position to meet or to know the immediate conditions under which the workpeople serve. "Bullying" foremen cannot nowadays be tolerated, and the success of a department or even of the whole concern must depend on the feeling existing between men who work together. The ideal is attained when workmen take such an interest in their particular work that no orders are necessary. Many American visitors to our factories are struck by the lackadaisical fashion in which our men move from one job to another. Is this state of affairs due to lack of interest, bad supervision, poor remuneration, or what?

Again, too little supervision is, if anything, worse than too much. It is entirely demoralizing for men to go to work from day to day, to be sent to a job and not have a word said to them as to the nature or progress of their task.

In transport work, men are very often required to work through a meal hour; in fact, it is the rule rather than the exception, for men employed in industrial transport to have to snatch their meals as and when the exigencies of the traffic will permit. In view of this it is absolutely essential that a co-operative feeling exists between foremen and workmen, if the necessary transport services are to be maintained at high efficiency.

It is advisable to keep individual records of all men employed in the department for immediate reference. These might be in the form of history cards, giving such useful details as the employee's number, name and address, age, war service, date of starting, grade, promotions and endorsements. In any question affecting the worker, these cards can be produced immediately and referred to.

Mr. I. Drever, discussing the human factor in industrial relations,¹ says: "Every man has an impulse in some degree to assert his individuality, and few things can wound a man more deeply than to be treated as if he did not matter, as if he were a mere cipher. The manner in which orders are given, the attitude assumed by superiors to inferiors, the way in which men are taken on, paid their wages or discharged, may be enormously significant for the efficiency of working of a factory, because of the influence of this factor. In this connection it is necessary to emphasize once again the advantage of the personally, as compared with the mechanically, controlled undertaking."

On the other hand, the departmental manager and administrator, compelled by their particular functions to hold the balance between "capital" and "labour"—and, as a rule, carrying on with less consideration than that usually given to the workman, but with due responsibility, and accepting comparatively small remuneration for long hours worked—have, perhaps, contributed in no small degree to the cause of industrial peace.

Safety First in Transport.

In transport, as much, if not more so, than in any other sphere of industry, the call for safety first is paramount.

In the movement and handling of material the risk of accident is never far away, and it behoves the transport manager, as far as is possible, and to the best of his

¹ *Industrial Psychology*, by Charles S. Myers, p. 25.

ability, to minimize these risks. The education of the worker and the provision of " safety first " equipment are a first necessity. Apart from any Factory Acts or Government Regulations (which are dealt with later), a good deal can be done by considering methods of working and so eliminating common causes of accident.

In locomotive working within factories, conditions are not always so favourable as those experienced in railway shunting yards. The same clearances are not always maintained, buildings have to be entered where, perhaps, manufacturing processes are being carried on, and the permanent way may not be quite in main line condition. In iron and steel works, locomotive men are called upon to handle ladles containing molten metal and slag, hot ingots or pig iron, and in these movements have to pass under overhead cranes in action, or past tapping furnaces; the shunters having to pass over uneven ground, often encountering many obstacles in doing so.

Shunting work usually calls for a large degree of care, but, as a rule, there is even greater need for caution in works locomotive practice than in railway shunting yards. The circumstances generally in works are more complicated, involving as they do movement of wagons inside buildings and plants, proximity to valuable machinery and men working, dangerous materials, weak lighting, numerous engines employed over certain areas the working of gantries, indifferent permanent way, and many other difficulties. Where manufacture is dependent on locomotive service for the constant supply of raw material, enginemen, while requiring to display the necessary care, have to get through their work speedily. Works traffic departments have usually on their pay roll some very handy and practical men, who, often in spite of very real difficulties, are able to keep plants running. Plant breakdowns sometimes involve greater calls on transport than usual, and it is seldom that the service is found wanting. It therefore follows that there is always considerable

It is advisable to keep individual records of all men employed in the department for immediate reference. These might be in the form of history cards, giving such useful details as the employee's number, name and address, age, war service, date of starting, grade, promotions and endorsements. In any question affecting the worker, these cards can be produced immediately and referred to.

Mr. I. Drever, discussing the human factor in industrial relations,¹ says: "Every man has an impulse in some degree to assert his individuality, and few things can wound a man more deeply than to be treated as if he did not matter, as if he were a mere cipher. The manner in which orders are given, the attitude assumed by superiors to inferiors, the way in which men are taken on, paid their wages or discharged, may be enormously significant for the efficiency of working of a factory, because of the influence of this factor. In this connection it is necessary to emphasize once again the advantage of the personally, as compared with the mechanically, controlled undertaking."

On the other hand, the departmental manager and administrator, compelled by their particular functions to hold the balance between "capital" and "labour"—and, as a rule, carrying on with less consideration than that usually given to the workman, but with due responsibility, and accepting comparatively small remuneration for long hours worked—have, perhaps, contributed in no small degree to the cause of industrial peace.

Safety First in Transport.

In transport, as much, if not more so, than in any other sphere of industry, the call for safety first is paramount.

In the movement and handling of material the risk of accident is never far away, and it behoves the transport manager, as far as is possible, and to the best of his

¹ *Industrial Psychology*, by Charles S. Myers, p. 25.

ability, to minimize these risks. The education of the worker and the provision of " safety first " equipment are a first necessity. Apart from any Factory Acts or Government Regulations (which are dealt with later), a good deal can be done by considering methods of working and so eliminating common causes of accident.

In locomotive working within factories, conditions are not always so favourable as those experienced in railway shunting yards. The same clearances are not always maintained, buildings have to be entered where, perhaps, manufacturing processes are being carried on, and the permanent way may not be quite in main line condition. In iron and steel works, locomotive men are called upon to handle ladles containing molten metal and slag, hot ingots or pig iron, and in these movements have to pass under overhead cranes in action, or past tapping furnaces; the shunters having to pass over uneven ground, often encountering many obstacles in doing so.

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risk of accident in works locomotive practice. As has already been stated, varying types of rolling stock, insufficient clearance for shunters, inadequate lighting, and bad permanent way are typical causes of accident. In addition, of course, the human element has to be reckoned with. The old adage, "familiarity breeds contempt" applies with added force in considering questions of "safety first." Locomotive drivers fail to make use of gauge glass covers and get burned in consequence; a driver gets familiar with the usual route over which he has worked for years without accident, he fails to keep a proper look out, and some other engine or crane gets in the way with serious results; both cases are the outcome of neglect. A shunter disregards instructions and indulges in pole-riding, sometimes with fatal results. He fails to use his coupling stick and gets crushed between buffers. Use and wont may induce a shunter to ride on the locomotive instead of preceding his train. Some points are wrongly set and a nasty accident is the effect. Similarly, the failure to protect an inter-works level crossing is often the cause of a fatal accident.

In very large works, especially where long lengths of track are being made use of both by "up" and "down" trains, proper signalling systems have been inaugurated. The introduction of a signalling system has, of course, other premier considerations, but, undoubtedly, proper signalling certainly minimizes the risk of accident in locomotive working within factories.

Factory Act Regulations in connection with locomotive working deal with many phases of shunting work, and every locomotive man should be thoroughly conversant with the terms of these Regulations.

Road transport lends itself peculiarly to study in connection with "safety first." "Safety first" on the roads affects everyone nowadays, either from the point of view of motor user or pedestrian. Commercial motor users are especially interested. It is safe to say that commercial road vehicle owners and users will welcome legislation

which will put the working of road traffic on a more satisfactory footing than it is at present. This new legislation will certainly involve many owners in additional expense, in that there is sure to be compulsory inspection of vehicles with the possible elimination of many old types.

The first report of the Royal Commission on Transport on the "Control of Traffic on Roads" ¹ (July, 1929) generally confirms the need for new legislation for the better and safer movement of traffic. In connection with speed limits, it is recommended by the Commissioners that the following regulations should be introduced—

Class of Vehicle	Maximum speed : Miles per hour
1. HEAVY LOCOMOTIVES—	
(a) Within any city, town, or village	3
(b) Elsewhere	5
2. LIGHT LOCOMOTIVES—	
(a) When not drawing a trailer, or when drawing not more than two trailers, all wheels of both the locomotive and any trailer drawn thereby being fitted with soft or elastic tyres	8
(b) In any other case	5
3. HEAVY MOTOR CARS—	
(1) Passenger Vehicles :	
(a) If all wheels fitted with pneumatic tyres and not drawing trailer	35
(b) In any other case	16
(2) Goods Vehicles and Motor Tractors :	
(i) <i>Without Trailer</i> —	
(a) If all wheels fitted with pneumatic tyres	20
(b) If all wheels fitted with soft or elastic tyres, some of which are not pneumatic	16
(ii) <i>With Trailer</i> —	
(a) If all wheels, both of the drawing vehicle and of the trailer, are fitted with pneumatic tyres	16
(b) If all tyres, both of the drawing vehicle and of the trailer, are of soft or elastic material, some of which are not pneumatic	12
(iii) <i>In any other case</i>	5

¹ H.M. Stationery Office. Price 1s net.

Class of Vehicle	Maximum speed : Miles per hour
4. MOTOR CARS—	
(1) Passenger Vehicles :	
If all wheels fitted with pneumatic tyres, not drawing trailer, and constructed to carry not more than eight persons (exclusive of the driver)	No Limit
If all wheels fitted with pneumatic tyres, not drawing trailer, and constructed to carry more than eight persons (exclusive of the driver)	35
In any other case	20
(2) Goods Vehicles :	
(i) <i>Without Trailer</i> —	
(a) If all wheels fitted with pneumatic tyres	30
(b) If all wheels fitted with soft or elastic tyres, some of which are not pneumatic	20
(ii) <i>With Trailer</i> —	
(a) If all wheels, both of the drawing vehicle and of the trailer, are fitted with pneumatic tyres . .	16
(b) If all tyres, both of the drawing vehicle and of the trailer, are of soft or elastic material, some of which are not pneumatic	12
(iii) <i>In any other case</i>	5

Overloading and faulty vehicles are not the least cause of serious accident on the roads, and these points will, no doubt, be given due consideration in future legislation for the control of road transport.

The League of Nations, Advisory and Technical Committee for Communications and Transit, has issued a Revised Report¹ of the Permanent Committee on Road Traffic regarding road signalling, which makes very interesting reading. All types and methods of signs and signalling are dealt with, and recommendations for the international unification of road signals are made. Insistent requests have been made to the League of Nations for intervention, and, no doubt, owing to the rapid and world-wide increase of motor traffic, very sympathetic consideration will be given to any recommendation the League Road Traffic Committee may have to make from time to time.

¹ League of Nations, "Road Signalling," Geneva; Feb., 1929.

In dock or wharf working, frequent causes of accident are bad slinging, capstan working, and strains due to over-exertion in lifting. Stringent regulations are in force in connection with the care of equipment used in lifting material and for crane working generally. As a rule, notices regarding common causes of accident in dock working are published, and statistics posted so that all the men concerned will have the subject of "safety first" constantly before their notice.

Some firms find it an advantage to employ "safety first" inspectors, who are authorized to deal with cases of careless working at first hand, and also investigate all accidents, publish statistics and details relating thereto, and to make recommendations for alterations or improvements which will tend to reduce risks. In some cases monetary awards are offered to employees for "safety first" suggestions.

The real need is for the education of the workers in the call and creed of "safety first."

Factory Act Regulations.

Factory and Workshops Acts affecting the conduct of industrial transport may be divided into three classes. These classes are—

1. Locomotives and wagons.
2. Road transport.
3. Dock regulations.

So far, few, if any, industrial firms own private commercial air transport, so that no account is taken, meantime, of this method of transportation in respect of governmental regulations.

Certain regulations are made from time to time by the Secretary of State under Factory and Workshops Acts, and all employees under whichever class of transport they are employed should be thoroughly conversant with the terms of the regulations affecting their particular duties. In addition to the posting of printed copies of all regulations (for the time being in force under the Act) in

conspicuous places throughout the factory, where they may be conveniently read by all persons employed, it is advisable to issue a printed copy of the regulations to persons as particularly affected. Not only is the owner or workman who fails to comply with the regulations liable to penalties, but the occupier is also liable unless he proves that he has taken all reasonable means by publishing, and to the best of his power, enforcing the regulations to prevent the contravention of or non-compliance with the conditions of the Act. In these circumstances it is as well to issue copies of the regulations to all employees, and secure a signature for their receipt, and continue the practice to all fresh entrants to the firm. In addition to this, a simplified form of the regulations applicable to employees can be drawn up and circulated either through the medium of lectures or incorporated in other Factory Rules. If any dubiety exists as to the correct interpretation of any of the regulations, the local H.M. Factory Inspector will generally be very willing to give his assistance on application being made to him.

In dealing with the first class of regulations already referred to, i.e., locomotives and wagons, attention is drawn to *Statutory Rules and Orders*, 1906, No. 679 (H.M. Stationery Office, price 2d. net), "Factory and Workshop, Dangerous and Unhealthy Industries," regulations, dated 24th August, 1906, made by the Secretary of State, for the use of locomotives and wagons on lines and sidings in or used in connection with premises under the Factory and Workshop Act, 1901. In these regulations, Part I deals with the protection of point rods and signal wires, obstructions to persons, examination of railways and points, construction of gantries, use of coupling poles, sprags and scotches, lighting and capstans. Part II deals with the placing of materials near lines of rails, crawling beneath wagons, use of coupling poles, sprags and scotches, propping or tail-roping, propelling of wagons, riding on locomotives or wagons during shunting operations, level crossings, protection of wagons under repair, movement of

capstans, and age limits for workpeople. Part III deals with gauge glass protection for locomotives or stationary boilers used for the movement of wagons.

It will be realized that these regulations fairly well cover all phases of shunting work and movement within factories, and are framed with due regard to difficulties which might be expected to arise in locomotive working in restricted areas. The regulations are reasonable throughout, and leave sufficient margin to deal with special circumstances. Taken as a whole, they most certainly form a basis for the introduction of safety first rules in factory locomotive working.

The Docks Regulations, 1925, dated 6th March, 1925, made by the Secretary of State under Section 79 of the Factory and Workshops Act, 1901 (1 Edw. 7, c. 22), in respect of the processes of loading, unloading, moving, and handling goods in or at any dock, wharf or quay, and the processes of loading, unloading, and coaling any ship in any dock, harbour or canal (*Statutory Rules and Orders*, 1925, No. 231; H.M. Stationery Office, price 3d. net) have to be studied in connection with the working of private docks or wharves.

These regulations deal firstly with safety measures on wharves, life-saving and first-aid apparatus, and lighting. It is important to note that, if, at any time, the number of persons employed exceeds fifty, an ambulance carriage must be maintained for the removal of serious cases of sickness or accident, unless such a vehicle can be called for by telephone from a place situate not more than two miles away. Part II of the Docks Regulations referred to deals with access between ships and quays and between the holds and decks of ships, as well as lighting, the lifting of beams by suitable gear, the marking of hatch coverings, the keeping of hatch beams in good condition, hand grips on hatch coverings, and the safe handling of fore and thwartship beams.

Part III is mainly concerned with wharf machinery, cranes and lifting apparatus, such as chains, rings, hooks,

shackles and swivels, wire ropes, and the stamping of the safe working load on such gear as pulleys, gins and blocks.

Details of the annealing of chains require to be entered in the prescribed register. The remainder of Part III of the Dock Regulations deals with safety in crane working and measures for the prevention of exhaust steam.

Part IV refers to safe working loads of lifting apparatus, the age of persons employed, and to passages to the ship on wharf or quay being left clear. The fencing of hatches, the unauthorized use of hatch covers, and the use of signallers during loading or unloading are dealt with under this section.

Part V covers the interference to general wharf gear by unauthorized persons and the use of alternative means of access.

The remaining part deals with the responsibilities of the employer in the use of machinery or gear, the compliance with the regulations, and the entering of certificates and production of the register on application of H.M. Factory Inspector.

So far as road transport is concerned, there has been no particular legislation to deal with the operation of road vehicles within factory areas. The following Acts and orders should, however, be studied in connection with road transport working generally—

Locomotives on Highways Act, 1896	. H.M S O. Price	2d. net
Locomotives on Highways Act, 1898	. " "	1d. "
Motor Car Act, 1903	. " "	2d. "
Road Transport Highway Act, 1927	. " "	3d. "
Road Vehicles Highway Regulations, No. 286 (Dated 19th April, 1928)	. " "	1d. "
Road Vehicles (Heavy Motor Car Amend- ment) Order, No. 614 (Dated 9th Aug., 1928)	. " "	1d. "

Disposal of Waste Materials.

The disposal of waste materials presents difficulty to many manufacturers for two main reasons—

1. Cost of disposal.
2. The reservation of the necessary land within the factory or elsewhere.

It may be asked what particular interest transport has in this subject, but it is usually the business and the responsibility of the transport manager to deal first hand with the disposal of waste material—transport being the prime factor in this direction.

Anyone who travels by train usually has a remark to make anent the extent and lack of picturesqueness of colliery heaps or steelworks slag-hills. But is it ever thought what happens to the waste or rubbish made or collected in lesser industries?

Many firms who have been in business for a long time have no longer any spare accommodation in which to dump such materials as boiler house ashes, cleanings from plants and wagons, excavations, and the numerous other waste matter which accumulates in a factory.

A good deal can be done by incinerating all burnable material, and ashes can always be made use of to some extent as ballast for permanent way and for roads and footpaths. Within recent years, iron and steel manufacturers have found a market for a large amount of slag in connection with road making, road repairs and concrete and brick making, as well as in the manufacture of basic slag for agricultural purposes, but even this market only absorbs a very small proportion of the current make. So far, little has been done in the way of finding a market for colliery waste, although there are, no doubt, possibilities in this direction also.

Transport of one kind or another is required in the handling and disposal of waste materials or products. Colliery waste may be, and is, usually conveyed by ropeway to the waste heap. Iron and steel works' banks are mostly fed by inclined railway, and sometimes tipping takes place at a height of 400 ft. Slag from these manufactures is tipped molten, being carried in heavy ladles which run between the furnaces and the slag tip. In other cases ground levelling may be carried on within limits, while the railway company may arrange to dispose of waste at a cost to meet carriage and tipping. Road

transport may be used to cart and dump the material in quarry holes or elsewhere, perhaps, at some distance from the works. Again, if sea transit is immediately available, hopper barges may be utilized to dump waste material at sea.

The latter method is nowadays largely favoured by firms having large quantities of waste materials to dispose of, and who have inter-works wharf facilities. Barges for tipping may be privately owned or hired, according to the tonnage to be carried. The actual cost of this operation depends greatly on the local conditions, the type of craft, distance to be covered before and after tipping takes place at sea and the state of the weather.

Internal tipping arrangements are best placed under the control of the transport manager, who can make use of his "floating" gang to augment the tipping squad, if required to do so. The size of the tipping squad can be regulated by the transport manager who will, of course, be responsible for deliveries of the material to the tip.

Modern science and research will, no doubt, tend to reduce the amount of waste material in manufacture, but, meantime, everything possible should be done to reduce present costs incurred in the disposal of material for which no use can be found.

The question of cleanliness or tidiness in factory working is receiving increased consideration by managements. The London Underground Railways issued a circular to their staff some time ago which read as follows—

"Tidiness leads to economy." Our conduct is influenced by environment, and the tidiness and cleanliness of premises provides an incentive to smartness in appearance and correctness in behaviour. Busy people sometimes regard tidiness merely as a habit and overlook its value as an aid to efficiency.

Many industrial firms could well take a leaf from the London Underground Railway Companies' book, and adjure their workmen and staffs to take a much livelier interest in keeping the factory clean and tidy.

In internal transport work the importance of tidiness

in everyday practice cannot be over-emphasized. It is money well spent to have works' locomotives and cranes looking as spick and span as the particular duties and conditions will allow. Similarly, road transport units should be well looked after. Internal rolling stock should have a cared-for appearance. Paint is not so very expensive, and effective legible lettering is a sound investment by way of advertisement. Permanent way offers scope for economical tidiness. There should be a systematic arrangement for cleaning up rubbish of all descriptions, weeding, leaving the sleeper tops thoroughly clean, and for laying down proper ash paths for shunters and other employees. Fire-cleaning, coaling and watering by locomotives or cranes should only be carried out at authorized points throughout the works. If indiscriminate fire-cleaning is allowed or tolerated, the chances are that sleepers are burned and the ashes have, sooner or later, to be cleaned up.

The moral influence of cleanliness in factory organization cannot be under-estimated. In a certain case where grass plots were arranged at the entrance and roadway into a steelworks, it was found that the effect of the experiment was astonishing. The cult spread to the works proper, to the melting shops, rolling mills and workshops. For weeks there was an ever increasing call for yard wagons to clear away loads of rubbish. It was observed that the men themselves began to have a smarter appearance. The cost of all this was infinitesimal, but the effect was great indeed.

A dirty and untidy factory tends to inefficiency and waste. A workman will hesitate to discard an erstwhile useful article if his surroundings are clean and tidy. On the other hand, if the place is dirty and untidy, work will easily be found for a salvage gang retrieving consumable stores.

Smoke abatement, the reduction of noise, cleanliness and tidiness generally, all ultimately present a good return on the capital expended, and movements towards this end cannot be too long delayed by those who would see the early return of prosperity to British industry.

Types of Transport Equipment.

It is difficult to keep pace with the manifold types of vehicles and equipment which can be utilized in the field of industrial transport.

Transport calls for equipment to be employed in two ways, namely, in actual movement or the transfer of goods from place to place, and for lifting or loading and unloading purposes. In the first case, methods of transportation may be divided into four classes. These are, over a railway, by road, by water, or by air.

So far as railway transport is concerned, goods may be loaded in a factory on to rolling stock which must be handed over to one or other of the railway companies for conveyance. This means that the trader requires to arrange a railway system of his own, to connect with the main system, and of sufficient scope and dimensions as to be able to deal expeditiously and conveniently with the amount of traffic he hopes to receive and dispatch. It therefore follows that some type of machine must be used in order to perform the necessary internal shunting of the wagons. The modern tendency is towards the employment of higher capacity rolling stock, and the first consideration must, of necessity, be the type and weight of permanent way. All things considered, it is most economical to lay the internal railways in bull-head rail up to 90 lb. per yard, with new creosoted sleepers and chairs, fishplates and keys of suitable calibre. The initial drainage and ballasting should be thorough. Points, crossings and other equipment must be in keeping with the type of permanent way selected. Sufficient clearances and level paths for shunters must be arranged, while point rods should be properly covered in accordance with the terms of the Locomotives Factory Act. The lay-out of the railways should conform to the needs of each particular plant served with adequate storage accommodation adjacent to the main feeder lines. It is obvious that in industrial transport working, sound permanent way is just as necessary as on main line railways, in

that, generally speaking, more movement takes place over small areas of line. In order that vital plants may not be held up, the risk of derailments with consequent delay must, as far as possible, be eliminated.

It now becomes necessary to consider the type of locomotive which will be best suited to the needs of the factory. Until now the ordinary steam engine has found most favour with industrial transport managers as being the most efficient and economical machine for everyday factory movement. For broad gauge working, types such as 0-4-0 with cylinders ranging from 12 in. to 18 in. diameter are mostly in evidence. For average shunting purposes the 14 in. \times 24 in. engine can be strongly recommended. Steam engines have long since proved their extreme reliability, and the fact that they still find favour with the railway companies and in large manufacturing plants suggests that a better haulage means has not, so far, been forthcoming. Where private branch lines have to be worked, as, for instance, in the feeding of collieries, quarries, etc., the introduction of large electric units may be considered economical. There are, of course, numerous types of locomotives apart from the ordinary steam engine which can be made use of in factory transport and shunting. Patent steam locomotives are becoming increasingly popular as shunting units, and are finding favour with the railway companies. No doubt, their utility in industrial shunting work will be duly considered by manufacturers concerned. Electrical locomotive units worked from overhead current, battery locomotives, fireless or petrol locomotives and Diesel-engined units are all available for consideration. In cases where very light or intermittent shunting work is involved, motor or battery locomotives may be found economical. It is put forward by the devotees of the internal combustion petrol locomotive, that these have advantages over the steam locomotive in that they:

- (a) Save steam raising and stoking and washing out.
- (b) Save time in coaling and watering; and

- (c) Maintenance costs are low, as is also capital expenditure, as compared with the steam engine.

The need of the moment is for a power unit which will deal with the ever increasing wagon tares and capacities, and give thorough and efficient service to the user at a minimum cost.

Internal rolling stock requires a good deal of care in selection. Primarily, the particular needs of the plant must be catered for. As an example, strong, heavy steel vehicles may be required for the transport of partly manufactured articles within a factory. For the general run of yard work, however, a wide selection of rolling stock can be made; re-conditioned or second-hand railway companies' vehicles can be secured at reasonable rates, but it is wise to make certain that an error in judgment is not committed in buying cheap second-hand wagons. A thorough examination of the vehicles should be carried out beforehand with special reference to the under-frames. Solebars, headstocks and cross-members should be in good condition, and wheels and journals should be tested as to flanges and gauge. It is well to have the wagon tare and capacity prominently shown on both sides of the vehicle. A proper numbering and lettering programme should also be adhered to. Care should be taken in the fixing of the capacity of wagons for internal use. There is a tendency for works' wagons to be seriously overloaded and roughly used generally. After the capacity has been fixed, with due regard to the state of the wagon, instructions should be issued to all concerned against overloading. Given a reasonable usage, there is no reason why even re-conditioned wagons should not provide the means of efficient internal transport over a very long period.

Road transport vehicles can be said to be multitudinous as regards classes, and there should be no difficulty in selecting the type best suited to the particular needs of the industry concerned. The development of the petrol vehicle has been rapid and continued

progress is being made. From 30 cwt. light lorries to large six or even eight-wheeled high or low loading vehicles there are intermediate ranges for the conveyance of all classes of goods. There is nowadays no limit of distance in respect of road vehicles, and their reliability is unquestioned. Articulated units for the conveyance of very heavy loads, such as boilers, transformers and even locomotives, are frequently seen on the highways.

Three and five-ton capacity heavy petrol lorries are recommended as useful types for everyday transport work. Steam lorries and trailers are suitable for short runs with heavy loads, while horse-drawn vehicles are still in favour for short distance and door-to-door work. Horses are also more economical for deliveries to docks where there is risk of delay in discharge, and in zones where traffic congestion is consistent. The electrical vehicle has, however, advantages over horse-drawn units inasmuch as it is cheap to operate, and is said to have a longer and more profitable life than the petrol vehicle. As against horses for door-to-door deliveries the electric wagon has the advantage of cleanliness, eliminating stable attention, and requiring little garage accommodation. Horse-drawn vehicles offer a problem to city or town transport committees as they are, undoubtedly, the cause of a good deal of traffic congestion, but, while the average business man would be sorry to see the passing of the horse from commercial life, there is little doubt that the general introduction of a cheaply-operated vehicle for short area deliveries, which will be speedier than the horse, is only a matter of time.

The importance of petrol tractors for haulage work cannot be under-estimated. These are specially useful for inter-factory duty when fitted with low-loading trailers. Tractors can also be used for trailing timber, rails and such-like materials on docks, etc., and may be utilized in the movement of wagons.

The future of road transport seems to lie in the introduction by British manufacturers of a " Diesel-engined "

unit capable of consuming crude oil, and giving effect to considerable reduction in running costs.

As regards privately owned shipping, the types of equipment depend on the water facilities, and on the nature of the material to be transported. For canal work, mechanically or horse-propelled barges are generally found to be convenient. These must, of necessity, be of a size consistent with the access available on British canal waterways. In regard to ordinary river shipping, tugs, towing dumb-barges, self-propelled barges, hopper barges, small steamers for coastwise deliveries, are amongst types in everyday use. For sea-going carrying, small vessels of dimensions suitable to meet conditions at all ports of call, built for convenient manoeuvring and operation in limited spaces, may be privately owned. Other sea services are usually hired or chartered.

In dealing with the loading and unloading of material or the handling of goods generally, there is an almost unlimited field of selection of various types of equipment. Cranes are the most common machines in present-day use for loading or unloading raw materials, heavy machinery or bulky articles of all descriptions. Locomotive cranes of 5, 7 or 10 tons capacity, fitted with suitable grabs, are specially suitable owing to their portability for the rapid discharge or the loading of raw materials from stock, and for works' purposes generally. These can also be used by the engineering department for erection purposes or in maintenance work.

In addition to this, the use of a heavy locomotive crane is necessary where a large amount of internal shunting is carried on, and where there is risk of accident or derailment. In this connection it is advisable for a certain amount of breakdown equipment, such as hydraulic jacks, slings, packing, lamps and other tools, to be kept, preferably in a particular wagon, to be available on short notice at the scene of any accident or derailment which may take place.

In buildings or in manufacturing plants, the loading



LIFTING NAVAL GUN MOUNTING WITH 150-TON
HYDRAULIC CRANE
(Messrs. Vickers-Armstrong, Ltd.)

and discharge of transport vehicles can be expeditiously carried out by overhead electric cranes. These are possible up to 100 tons capacity.

Cargo handling at private docks or wharves is usually carried out initially by cranes. Cranes of electric type with luffing jibs are sound units. Grabs, slings, platforms, suction pipes and other incidental equipment can be used with the cranes in loading or discharging.

In order to avoid double-handling, such equipment as ropeways or belt conveyors requires mature consideration in the interests of economical handling of materials. Ropeways can be introduced for fairly long distance conveyance, and have the distinct advantage of eliminating transfer, or, in other words, giving direct service. They are especially useful for the transport of raw materials such as ore, coal, sand, limestone, etc., and can also be successfully utilized for miscellaneous goods, which can be carried on trays or cradles. Ropeways are useful in conveying waste materials to dumps, as, for instance, at collieries, or for loading stone or other material from quarries direct into wagons at the nearest point. The case for ropeways against other methods of handling, such as by railway wagon or by road vehicle, is that re-handling is saved, while considerable economies can be effected in operation. Ropeways can be used in conjunction with other mechanical handling equipment, such as conveyors, elevators, etc.

Conveyors are of most utility in internal conveyance or in feeding ropeways. In mass production processes, belt conveyors form an essential part of the manufacture.

Labour-saving devices in connection with the handling of goods are of vital interest to the transport official, in that every avenue must be explored in order to reduce the cost of distribution. Apart from bulk materials which may be loaded into wagon, road vehicle, ship, or barge direct from the manufacturing plant, most goods have to be properly set into the transport unit either by hand, or by the assistance of mechanical means. Overhead or

portable magnet cranes may be utilized to load and discharge pig iron, scrap iron, or iron and steel plates, rails, etc. For miscellaneous goods, packed in boxes, barrels and bags, electric platform trucks may be used to advantage. The container system which is being rapidly developed and extended by the railway companies, allows such articles as tea, sweetmeats, etc., to be much more rapidly and economically handled than was formerly the case.

CHAPTER VIII

THE SHIPPING OF GOODS BY SEA

BEFORE discussing details of the various shipping sections which form another link of the transport manager's responsibilities, it may be of interest to say something concerning the ship itself and the regulations appertaining thereto. As an example, we have to-day not only the recognized standard type of vessel sailing to all parts of the world, but also specially designed and constructed ships for specific kinds of trade, which, by the somewhat revolutionary ideas incorporated in their building, have somewhat surprised the more orthodox shipbuilders, and given rise to great debate as to whether the vessels would turn out to be really economical propositions.

Types of Ships.

Cases have occurred where firms have had ships built and equipped for the express purpose of being able to carry, in addition to a large below-deck cargo, an abnormal deck cargo. These ships were intended for the conveyance of locomotives, railway coaches and rolling stock generally. In order to ensure safety for the deck cargo, all the hatchway coverings and hatch beams were specially strengthened, so that the weight might be evenly distributed, and special warwick screws of abnormal size were fixed to the sides of ships to enable lashings to be placed through these to the deck cargo and securely fastened.

In addition, there is a specially heavy derrick on some of the ships capable of lifting approximately 100 tons, and worked from large winches. Special guy ropes, worked also from winches, assist in the slewing of the derricks to allow of the ship itself being responsible for the loading or unloading of any abnormal cargo at foreign ports where equipment is not available.

It will be seen, therefore, from this example that, in

addition to coasting vessels, tankers, tramps, large liners and the like, the transport manager may be called upon to deal with unusual shipping difficulties.

According to Section 742 of the Merchant Shipping Act, 1894, certain definitions apply to all sea-going craft, and these, reiterated here, may serve as a useful guide for the student.

A VESSEL includes any ship or boat or any other description of vessel used in navigation.

A SHIP includes any description of vessel used in navigation, not propelled by oar.

FOREIGN GOING SHIP includes every ship employed in trading outside the Elbe and Brest limits.

HOME TRADE SHIP includes every ship employed within the Elbe and Brest limits.

HOME TRADE PASSENGER SHIP means every home trade ship employed in carrying passengers.

Unless exempted, every British ship must be registered under the Act of 1894.

Any ship not exceeding 15 tons net registered tonnage, plying on rivers or about the coasts of the United Kingdom, or on rivers or coasts of British Possessions within which the managing owners reside, may be exempt.

Likewise, ships not exceeding 30 tons net registered tonnage, not having a whole or fixed deck, and employed solely in fishing or trading coastwise on the shores of Newfoundland or parts adjacent thereto or in the Gulf of St. Lawrence, or on such portions of the coast of Canada as lie at the back of that Gulf, may be exempt from registration.

Before any ship can be registered, it is necessary to have her surveyed and measured by a competent surveyor of ships and the tonnage ascertained.

Another important item concerning registration is the proper marking of the name of the ship and the port of registry. The name must appear on each of the bows of the ship, and the port of registry must appear on the stern. The letters so painted must not be less than 4 in. in length and of a recognizable breadth.

The official number and the registered tonnage of the ship must be cut in the main bearing.

A scale of feet denoting draught of water of the ship must be marked on each side of the bows and stern post in roman letters or in figures not less than 6 in. in length, the lower line of such letters, or figures, to coincide with the draught line already mentioned; figures to be cut and painted in accordance with Board of Trade regulations.

All ships proceeding to sea (unless under 80 tons registered tonnage and solely engaged on pleasure or fishing) must have a load line marked on their sides amidships, namely, a circular disc 12 in. in diameter with a horizontal line 18 in. in length drawn through its centre. The centre to be placed at such a level as approved by the Board of Trade.

The register is kept by the official Registrar, who is the Chief Officer of Customs at the port where the ship is registered.

It is interesting to note that not more than 64 individuals are entitled to be registered as owners of any one ship at the same time. This rule does not apply, however, where the beneficial title of any number of persons, or of any company represented by, or claiming under, or through, any registered owner, may be concerned.

No person is entitled to be registered as owner of a fractional part of a share of a ship, but any number of persons not exceeding five may be registered as joint owners of a ship or of any share or shares therein.

It is well to note that the register referred to is of great importance, and, when desired, it may be inspected (according to Section 64 of the Act) on payment of one shilling on application being made to the Registrar during official attendance hours.

The number of ship's papers officially recognized is also important. These comprise the following—

1. Certificate of Registry.
2. Agreement with crew for the voyage (Articles).

3. Charter Party and Bills of Lading.
4. Bill of Health.
5. Manifests containing particulars of cargo.
6. The official log.

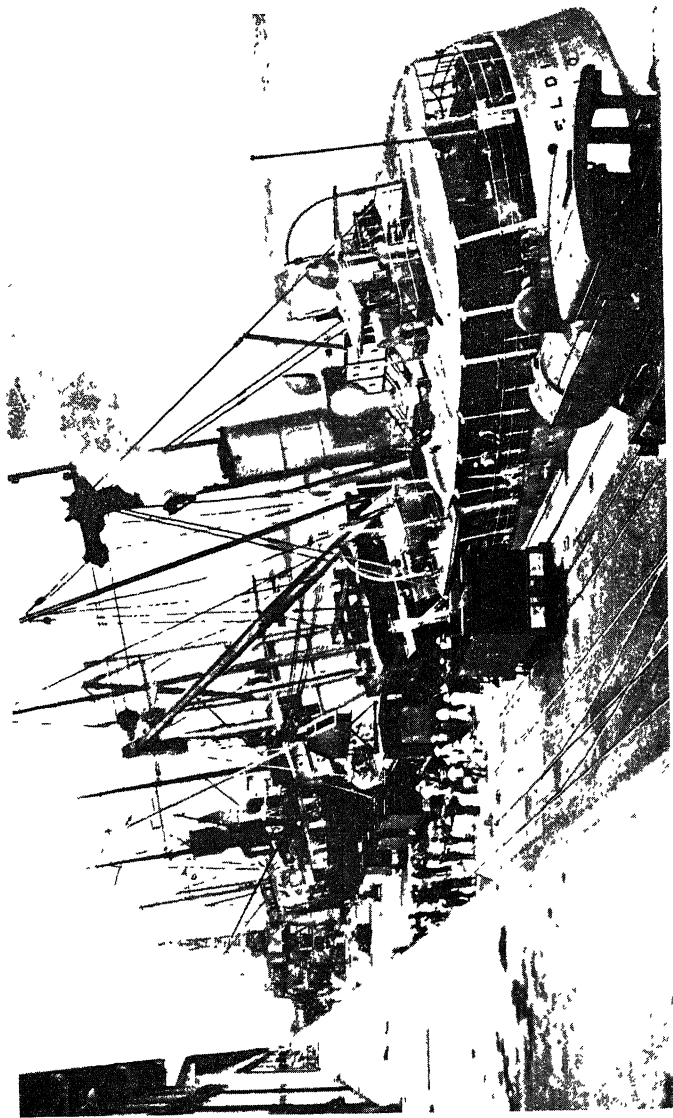
Imports and Exports.

Certain specialist knowledge must be possessed by the industrial transport manager and his staff in the "shipping section" in regard to routine work in connection with import and export of goods. This will, of course, apply under whatever conditions and methods the shipping is carried out, that is, whether from private wharves or from nearby or distant ports, and whether the shipping consists of overseas, coastwise, and canal or river transport.

In cases where a large trade is carried on abroad by means of distributing centres, besides the need for a very wide geographical knowledge, the transport manager must possess practical information as regards the transport conditions and costs in the particular countries where the business is carried on. In addition, when new business is being considered abroad the important factor of transportation and transportation costs throughout will be referred to the transport manager, so that this official must be in a position to give definite information as to general conditions, routes and costs on the shortest notice.

Close liaison must be maintained with shipping companies and shipping and forwarding agents, but in many cases it is considered desirable for industrial concerns, where the amount of shipments warrants, to create and develop their own shipping departments.

The choice of routes and the wide field of possible saving in expenditure which may result from specialist knowledge of shipping can by no means be over-estimated. A similar position will exist in regard to the choice and route of land service abroad. A large variety of transport and labour may be involved in the movement of goods before the material reaches the shipping port. Again, there may be



DISCHARGING LOCOMOTIVES BY SHIP'S DERRICK
(SUN W G Armstrong, Whitworth & Co, Ltd.)

need for coastwise or river transport before overseas shipment begins, involving transshipment and the consideration of loading and transshipment facilities generally. Cases may be submitted to shipping companies which will induce the companies to introduce a new port of call.

As regards both import and export shipments, a thorough knowledge of "shipping" business methods and the manifold shipping documents must be possessed by the transport manager and those directly responsible for the efficient functioning of the shipping section. Not only this, but a knowledge of the technique of bills of lading, charter parties and insurance policies is suggested as vitally necessary.

It is not intended here to deal with detail-matter in regard to the vast, and sometimes complicated, business of "shipping," as a particularly wide choice of works on each phase of the subject already exists. Passing reference, however, may be made to the more important points or those which affect the transport manager concerned with the responsibilities of a shipping department. A knowledge of shipping documents is a great advantage, and it is desirable that a bill of lading be thoroughly understood. A bill of lading may be regarded as a document embodying—

1. A receipt for goods shipped.
2. A contract for the carriage of the goods.
3. An evidence of property, the entitlement to which may be transferred by endorsement.

Although a bill of lading is not legally a negotiable instrument, it is common practice to make use of such a document for pledging purposes or for raising a loan.

As a rule, three copies of a bill of lading are prepared, one stamped and two plain, one plain copy being retained by the consignor, and the other plain copy being carried by the master of the ship; the stamped copy is forwarded to the consignee. Special attention should be paid to bills of lading given for goods shipped under charter-parties, and to the various clauses of the bill of lading generally.

A knowledge of the subject of chartering is essential to those dealing with the shipment of goods abroad. Chartering is hiring, and a charter-party is a document which embodies the conditions and terms agreed between the owner of a steamer and the hirer or charterer of the steamer.

There are three types of charter, viz. Time Charter, Voyage Charter and Denuse Charter. The first-named explains itself, the ship being hired over a period of time. The "Voyage Charter," which perhaps more than the others is of interest to the industrial transport manager, deals with the chartering of ships for the conveyance of particular cargoes between specified ports for an agreed amount of freight. A "Denuse Charter" involves the transfer of the "empty ship" from the shipowners to the charterers, the latter becoming liable for all running charges.

The prominent features of a charter-party are the rates of freight, time and rates for loading and discharging, date of loading and cancelling, description of ship and the cargo to be carried, port of loading and destination, and agency and brokerage arrangement.

Chartering is usually carried out in the various shipping exchanges of the United Kingdom, where traders, brokers, agents, and shipowners meet. The facilities of these exchanges give ample opportunity for shipping business being expeditiously carried on without the necessity for calls or protracted correspondence. Voyage charter rates are, of course, affected by the law of supply and demand, although, the "voyage" charter market is, as a rule, steadier than the "time" charter market. The question of "lay days" is important in a "voyage" charter. These "lay days" can be likened to the "free days" allowed in respect of railway companies' wagons before demurrage becomes chargeable. In other words, "lay days" are the number of days a vessel, when on charter, is allowed for the purpose of loading and discharging.

The importing and exporting of goods differs so widely

in practice at different ports, in various port charges, and in the particular classes of cargo dealt with, that it is impossible to treat the subject as it deserves. For instance, the means of transport made use of between the works and the port, which may be direct rail, rail and cartage, cartage, rail and cartage, road direct or lighterage, have an important bearing on what, after all, are most vital, namely, costs. Warehousing at shipping ports, where goods may either be stored awaiting shipment or drawn to the works as required, is also a point which can be elaborated.

The marking of freight, calculation of measurement—freight charges usually being based on weight or measurement, whichever yields the greater freight—(40 cub. ft. to the ton being the usual measurement basis) and loading conditions at the ports affected are all points of particular interest to the transport manager.

Shipping Terms.

The following abbreviations and explanations will assist the reader to familiarize himself with those shipping terms more generally met with in daily practice—

ALL PURPOSES. Refer to lay-days in a charter party or negotiations where a special number of days or hours is given for "all purposes," which means total days or hours for loading and discharging.

BARRATRY. An unlawful or fraudulent act.

B/L. Bill of lading.

C.I.F. Cost, insurance and freight.

C/P. Charter party.

DEMURRAGE. When agreed lay-days for loading or discharging are exceeded.

DUNNAGE. Material, planking, mats, etc., for placing between cargo and ship's sides when cargo is being stowed.

FAIRWAY. A clear passage-way in river.

F.A.S. Free alongside.

F.C. & S. Free of capture and seizure.

F.I.O. Free in and out, which means cargo has to be loaded, stowed, and discharged free of all expense to the ship.

F.O.B. Free on board. Denotes shipper's obligation to deliver to ship's rail.

F.P.A. Free of particular average.

JETTISON. Casting the goods into the sea.

JETSAM. Goods cast into sea for the preservation of ship.

LAY-DAYS. Days allowed for loading or unloading of ship. The number of days must be expressly defined by the charter party or bill of lading in terms of time or quantities per day.

LIGHT DUES. Dues payable by all ships, except H.M. ships or ships exempted from payment under Merchant Shipping Act, 1894. All Light Dues Tables are posted up at all Customs Houses in the United Kingdom.

MARKING OF ANCHORS AND CABLES. All anchors and cables must be marked by the manufacturer's name and initials on the crown, and also on the shank under the stock. In addition, the anchor must be marked with a progressive number and with its weight.

PRIMAGE. Sum (usually 10%) demanded from the shippers in the liner deep sea trade in addition to the freight; in practice, returnable to the shipper in a form of deferred rebate, subject to the compliance by the shipper with the terms of the bill of lading.

RUNNING DAYS. Are consecutive days of 24 hours—a term used to indicate the time at the disposal of the charterer in which to load and/or discharge a vessel.

SHIP'S HUSBAND. Person or agent concerned in the management or running of a vessel.

WHARFAGE. The charge made for use of wharf.

WHARFINGER. The owner or manager of a wharf; the senior official in charge at the docks.

Customs Practice.

It is generally known that certain customs formalities have to be complied with in connection with shipping. These may be divided into two distinct sections, viz.—

1. Clearing a vessel inwards.
2. Clearing a vessel outwards.

As regards the incoming vessel, customs regulations under the following headings apply—

- (i) Report.
- (ii) Pratique.
- (iii) Inward Pilotage.
- (iv) Dock or Harbour Tonnage Dues.
- (v) Light Dues.
- (vi) Passenger List.
- (vii) Ship's Protest.
- (viii) Articles and Discharge Books when paying off.
- (ix) Stores Authority Bond Note.

- (x) Duty Outwards Forms.
- (xi) List of Aliens.
- (xii) Ship's Register (applicable Inward and Outward).
- (xiii) Customs Clearance Form.

The two items (ix) and (x) also refer to vessels outward bound, but for general convenience of the master and to save a second trip to customs, these are usually complied with at the time of incoming clearance of the vessel.

Briefly, the explanations of those regulations referred to are—

(i) **REPORT.** Describes the ship, gives particulars of cargo, names of ports where cargo was shipped and description of same, whether the cargo, or any part of it, is for any other port in the United Kingdom, whether any cargo remains on board, and name of consignees. Particulars of any wreck sighted or encountered or of any accident which may have occurred during the voyage must be given.

A steamer having discharged a cargo in a port, from whence she proceeds in ballast, must be jerked by Customs Authorities, the Jerque Note representing the Master's Clearance.

(ii) **PRATIQUE.** More or less a bill of health. If the Customs Authorities, after boarding any vessel while lying off a port, are satisfied that no infectious diseases exist on board, a Pratique is handed to the master.

(iii) **INWARD PILOTAGE.** After a pilot has brought a vessel into port he signs and hands to the master a form upon which particulars of draft and tonnage are given. Pilotage charges are calculated on a ship's draft and tonnage. The Pilot Card is then handed to the Port Authorities, and the charges usually paid by the agents of the steamer.

(iv) **DOCK OR HARBOUR TONNAGE DUES.** Are those charges levied by Port Authorities to go towards the upkeep of all landing stages, moorings, equipment, etc.

(v) **LIGHT DUES.** Are collected by Customs officials on behalf of Trinity House for maintenance of lighthouses, etc.

(vi) A complete Passenger List, giving names, occupations, port of embarkation, and addresses whereat they intend to reside, must be forwarded to the Customs Authorities.

(vii) **SHIP'S PROTEST.** Refers to particulars contained in a sworn declaration by the master before a Notary Public at the end of a voyage on which heavy weather may have been experienced. Underwriters invariably demand sight of this Protest before settling claims.

(viii) Refers to articles signed between master and crew.

(ix) and (x). Already explained.

(xi) **LIST OF ALIENS.** List of alien members of crew to be furnished.

(xii) **SHIP'S REGISTER.** This is the most important document of all. Must be produced when clearing both in and out. Captain's name entered.

(xiii) **CUSTOMS CLEARANCE FORM** Customs clearance is granted by Board of Trade after crew have been discharged.

So far as outward clearance of a vessel is concerned, the following regulations apply—

- (i) Entry Outwards (blue form).
- (ii) Light Dues and Tonnage Dues.
- (iii) Victualling Bill.
- (iv) Bills of Health.
- (v) Passenger Lists.
- (vi) A.A. Forms (when crew signed on).
- (vii) Clearance Label.
- (viii) Clearance Seal.

The explanations of these terms are as follows—

(i) **ENTRY OUTWARDS FORM.** Must be produced to H.M. Customs before vessel starts to load.

(ii) **LIGHT DUES AND TONNAGE DUES.** Tolls levied on a ship toward the maintenance of lights, beacons, buoys, etc., placed for her guidance.

(iii) **VICTUALLING BILL.** Complete summary of amounts of all bonded goods on board. Number of passengers and crew must be stated on this bill.

(iv) **BILLS OF HEALTH.** Obtained from the Customs Authorities. Separate bills are necessary for the different foreign countries at which the ship may be calling, in the majority of cases to be used by Consul of country to which ship is bound. (Not necessary in the case of British Colonies.)

(v) **PASSENGER LISTS.** If passengers are landed at the ports for which Bills of Health are obtained, a separate passenger list must be made out for each port, giving names, port of embarkation and destination of each passenger. After vessel has sailed a detailed list of passengers carried outwards must be forwarded to the Customs, who will, in turn, forward to Board of Trade.

(vi) **A.A. FORMS.** A.A. Form is obtained when crews are signed on.

After all the above forms (i) to (vi) have been duly completed, the victualling bill is attached to the clearance label and seal.

On the label is written the name of the ship and that of the master.

The clearance label and seal forms are obtained free of charge from the Customs Authorities.

All the forms must now be taken to the Customs House, where they will be checked, and, if found correct, the label will be signed and stamped, which signifies that the ship may proceed to sea.

Shipowners and agents are requested, by means of declaration (inwards) and specification (outwards), to furnish to the Customs Authorities within a period of six days full particulars of all goods imported into or exported from the port, giving particulars of marks, numbers, net weights and value of each article, and country of destination.

Declaration forms giving particulars of goods and net weights and signed by each individual importer and exporter, are handed to Harbour Dues Authorities in order to facilitate the collection of dues.

Marine Insurance.

This subject is one of such magnitude and importance that only passing reference to it can be made here.

Marine insurance is of ancient origin, and came into force in England about the end of the sixteenth century. The present Act governing this form of insurance is the Marine Insurance Act of 1906.

Underwriters are the important people so far as marine insurance is concerned, on account of the fact that the underwriter always subscribes his name to the policy in which he is concerned as a surety that, in case of losses, he will be answerable for the amount guaranteed. According to Section (1) of the Act of 1906, a contract of marine insurance is "A Contract whereby the Insurer undertakes to indemnify the insured in a manner to the extent agreed against Marine losses incident to Marine Adventure."

According also to the aforementioned Act, marine insurance may be applied to inland water courses, ships in course of construction, or the actual launch. Generally

speaking, it may be said that all the ordinary rules of law applicable to contracts are observed in the case of marine insurance. For example, there must be—

1. Offer and acceptance.
2. Legality of the object.
3. Capacity of the parties to contract.
4. Consideration.

As in all other forms of contract by policy a contract of marine insurance naturally becomes null and void, if, by any chance, there should be an attempt at fraud or misrepresentation in connection therewith.

According to the Stamp Act, 1891, all policies after completion must be stamped, and the terms of subsequent Finance Acts should be applied. Some facts in connection with the general practice of marine insurance may be of added interest at this particular stage. For instance, should a shipowner desire to insure his vessel, he will, of course, approach a marine insurance broker giving all necessary instructions as to the amount of insurance. The broker then writes out details of the same on what is called a "slip," and the amount of insurance to be placed with underwriters, who will each initial the "slip" against the amount to be guaranteed. The broker afterwards makes out "long slips" which give further particulars, and these he hands on to the interested underwriters. These "long slips" in this form actually constitute a request for the policy to be executed.

The amounts deducted for brokerage charges in this respect are of interest. The usual brokerage charge is 5 per cent of the amount of the total premium, and the underwriter also deducts 5 per cent when debiting the premium to the broker, and a further 10 per cent from the balance in respect of the discount. In turn, the broker then debits his principal with the full premium less 10 per cent on 95 per cent of the premium. There is then a further deduction of 1 per cent by the broker for commission from any claims that may be collected from the underwriters for his principal. The premium is generally

settled between the underwriters and the insurer or broker, if such is employed. As it is necessary that some elementary knowledge of the duties on marine insurance policies should be possessed by the traffic student, some facts concerning these are undernoted—

1. Where the premium does not exceed the rate of 2s. 6d. per cent on the sum insured rd.
2. In any other case—
 - (a) For or upon any voyage in respect of every £100 and also any fractional part of £100 . . . rd.
 - (b) For time in respect of every £100 and also any fractional part of £100:

Where the insurance is made for any time not exceeding 6 months	3d.
Where the insurance is made for any time exceeding 6 months but not exceeding 12 months . . .	6d.

In accordance with the Finance Act of 1901, a continuation clause was made permissible in a time policy, which extended the validity of the insurance for a period not exceeding 30 days, if the ship happened to be at sea when the policy expired. In such a case extra stamp duty of 6d. is required.

Unless a marine insurance policy contains some express clause to the contrary, it is always assignable.

Some particulars regarding various forms of marine insurance policies may not be out of place at this juncture.

1. **TIME POLICY.** Usually made for a fixed period not exceeding 1 year and 30 days, the 30 days being a "continuation clause" already referred to.

2. **MIXED POLICY.** Generally where time and voyage are specified in the same policy.

3. **VOYAGE POLICY.** Where the subject matter "as and from" is insured. Actually, in such a case, the risk begins at, and as soon as, the vessel is within the port.

4. **VALUED POLICY.** This is where the agreed value of the insurance is stated in the policy.

5. **UNVALUED POLICY.** Where the value of the subject matter is not specified or mentioned in the policy.

6. **FLOATING POLICY.** Differs to some extent from the other types, but according to Section 29 of the Marine Insurance Act, the following regulations obtain: "(a) A floating policy is one which describes the insurance in general terms, and leaves the

name of the ship or ships and other particulars to be defined by a subsequent declaration. (b) The subsequent declaration or declarations already referred to may be made by endorsement on the policy or in other customary manner (c) Unless the policy otherwise provides, the declaration must be made in the order of despatch or shipping; they must, in the case of goods, comprise all those consigned within the terms of the policy, and the value of the goods or other property must be honestly stated. An omission or erroneous declaration may be rectified, even after launch of the ship, or arrival, provided the omission or erroneous declaration was made in good faith. (d) Unless the policy otherwise provides, where a declaration of value is not made until after notice of loss or arrival, the policy must be treated as an unvalued policy as regards the subject matter of the declaration."

CHAPTER IX

SHIPPING FACILITIES

MANY transport managers are keenly interested in the future of our canals and inland waterway systems. The history and development of British canals provide material for intensive study by the transport student, although industry is more concerned with present-day problems and future prospects.

Canals and Inland Waterways.

There are approximately fifty canals in England and three in Scotland, of which about 30 per cent is railway owned or controlled, the total mileage of river and canal waterway being roughly 3,800 miles. Tonnage conveyed by canals has shown a steady decrease since the peak year in 1913, falling from 27 million tons over independent canals in that year, at approximately a rate of decrease of a million tons per year.

The advent of the railways was, of course, the first serious blow to the canals, which till that time had been an extremely lucrative investment to shareholders; but, no doubt, lack of capital for development, increased road competition and, perhaps, the call for greater speed in delivery have been responsible for recent decline.

A Royal Commission set up in 1906 suggested unification under a waterway board, while at a later date a committee under Mr. Neville Chamberlain again suggested unification and amalgamation, and a suggestion made as regards the River Trent between Nottingham and Newark has been carried into effect.

Geographically, Great Britain is at a distinct disadvantage in regard to inland water transport as compared with other countries. In this country no industrial centre of any note is more than 80 miles from the sea, so that

cheap water transport, even were it available, is not always of advantage.

As to the future of inland water transport, the solution of the problem seems to be the complete closing of narrow waterways, and the improvement of arterial lines to allow of up-to-date barge trains hauled by mechanical means. Whether state control or the establishment of a waterways authority would offer a solution to the problem remains to be seen, but, no doubt, finance and the state of trade will be the deciding factors. Besides the improvement of the canals themselves and the means of transport, discharging and loading facilities, warehouses, and improved arrangements as regards freights and tolls are all involved as part of the general scheme.

In the transport of raw materials between inland points and the sea or vice versa, there can be little doubt that a cheap means of carrying would receive the due attention of transport managers.

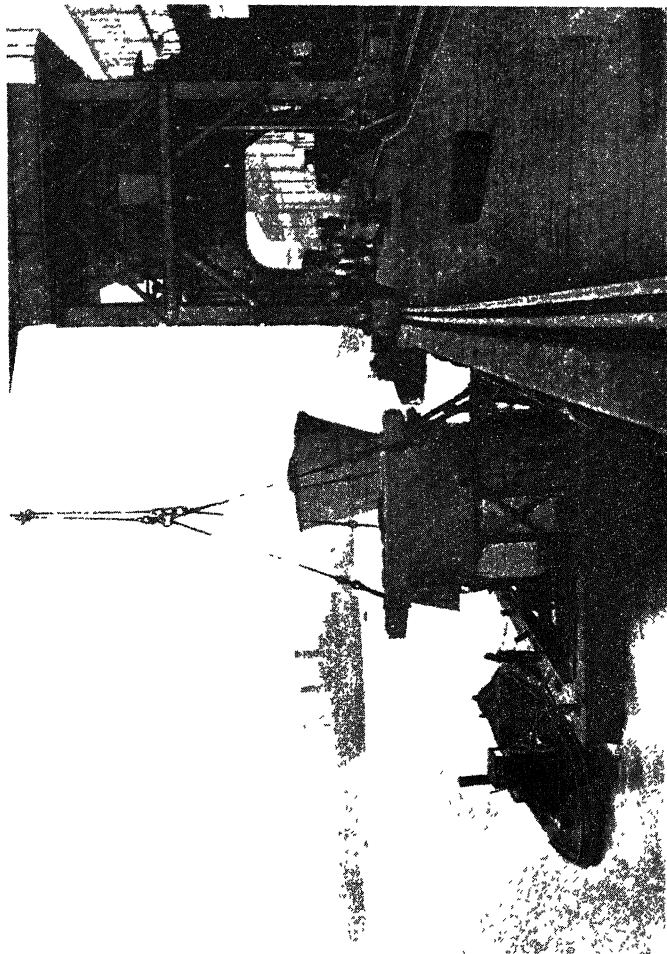
After all, we have within recent years seen extraordinary developments on the roads, and who knows but similar important changes affecting our inland waterways may come into being at any time.

Coastwise Shipping.

Coastwise shipping presents to the trader, who is in the fortunate geographical position of being able economically to make use of it, a particularly sound and dependable means of transport.

Coasting vessels form a link round Great Britain and Ireland, and regular services are maintained from all important ports. Reliable and cheap service is given and reasonable time occupied in transit, despite the rough weather often encountered.

Large industrial centres are usually connected by sea direct or by river, and coasting steamers are accessible either directly by private wharf, by easy rail connection, or by short road routes. Again, lighters or barges are frequently used for deliveries to and from the steamers.



PRIVATE WHARF WORKING—EQUIPMENT
(Messrs Vickers-Imstone, Ltd.)

Coasting vessels are utilized to a very large extent to carry transfer cargoes from main ports to the lesser ports in the United Kingdom, or, in other words, as distribution agents to the large ocean liners. There is practically no limit to the class of merchandise which can be carried by the modern coasting vessel. Should shore appliances not be available, loading and discharging can be effected by the ship's gear.

As a rule, coasting shipping services are very highly organized, and strict attention is given to the requirements of shippers. A good deal of latitude is allowed local branches or agencies, to carry out as far as possible the particular requirements of local traders, consistent with maintaining the scheduled service.

The rates charged by coasting shipping companies in respect of coastal liner services are usually on a tonnage basis, and include the cost of loading and discharging, the class of goods—weight in relation to bulk—and distance carried being the predominating factors. No doubt, rail competition is taken into account, but usually the shipping companies can offer more favourable rates than those quoted by the railway companies. Road transport competition has also now become an important consideration, though perhaps to a lesser degree than that of railways.

No bill of lading or other form of contract is used in coastwise shipping, details of each consignment being shown on a manifest sent to each discharging port. Freight may be either "paid" or "to pay," and be collected on delivery or by arrangement of monthly account.

Through rates are in some cases in operation over sea and rail combined. Lists of rates in operation for coastwise shipment in respect of regular traffics are available at shipping offices. It will be found that these rates seldom fluctuate.

It will be appreciated that expert knowledge is applied to the stowage of coasting vessels, small lots of cargo of all classes being offered on short notice; if several ports

of call are involved, the avoidance of double-handling has to be strictly borne in mind.

Coastwise vessels served as important transport units before railways were thought of, and, undoubtedly, will continue to offer cheap and efficient service to the community for many years to come.

Private Wharf Working.

Many advantages in the way of cheap transport accrue to the fortunate firms whose works are so situated that water access is available through the medium of a private wharf connected to the main plants by another transport link. Good rail and road access to the wharf are essential adjuncts to efficiency in this respect.

Many pertinent questions arise in connection with the building and equipping of a private wharf. First of all the size and nature of the wharf will, of course, be determined by the volume and type of commodities imported and exported. The possibilities of future extensions required on account of increased traffic must be borne in mind, especially in so far as the securing of the land and the erection of adequate foundations are concerned.

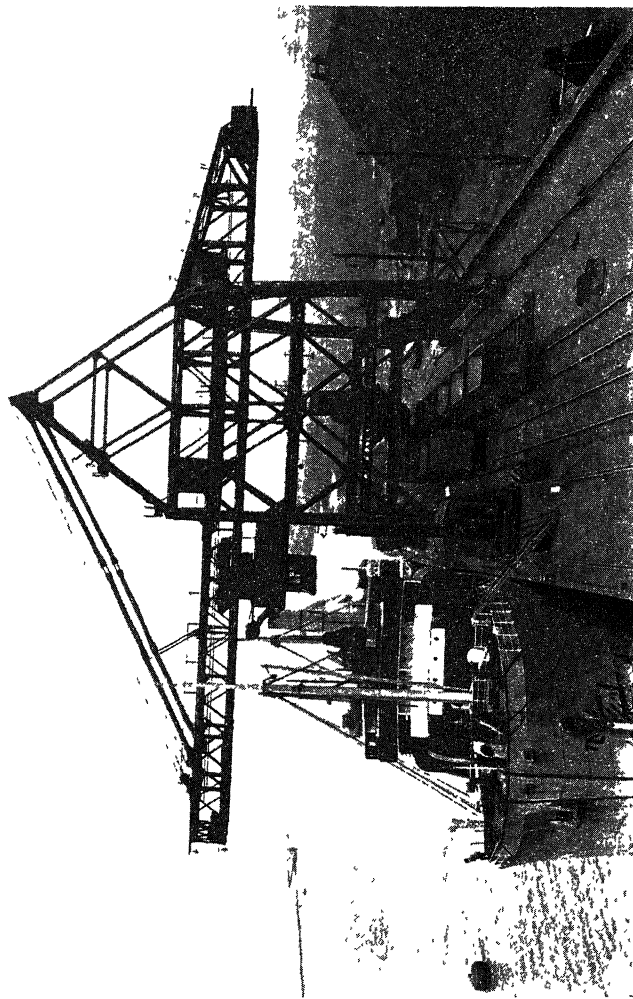
The following points are also important—

1. The nature of the waterway (whether tidal).
2. The depth of water available.
3. Width for turning vessels.
4. The amount of dredging necessary.
5. The necessity for piling.

River obstructions such as locks or bridges, the amount of traffic, and the cost of tolls and pilotage are also points for consideration.

The equipping of the wharf must be the subject of serious deliberations by all interested parties. Mistakes made in this direction often require to be dearly paid for.

It is seldom that shed accommodation is required on a private wharf, cargoes being dealt with direct to and from plant and ship by rail or conveyor systems. The selection of lifting gear, i.e. cranes, is most important. Electric



PRIVATE WHARF—TRANSPORTER CRANE

cranes of the luffing-jib type of capacities ranging from 30 cwt. to 10 tons for normal working are usually adopted. Where specially heavy lifts are necessary, as in the case of partly-finished articles being moved from one works to another on the same waterway, special cranes or even floating cranes may be necessary. Similar heavy equipment may also be necessary for shipments of locomotives, heavy boilers and machinery.

In order to eliminate wharf shunting as far as possible, and to prevent delay in loading or discharging, it is advisable to provide adequate capstans of the electric or hydraulic type with the necessary tackle such as haulage ropes and, of course, bollards and fairleads. The railway lay-out on the wharf should be set with a view to capstan working, and in this respect there should also be sufficient storage siding accommodation close by the wharf for out and in traffic, and traffic awaiting shipment.

There should also be sufficient loose wharf equipment such as slings, chains, hooks, grabs, tubs, skips, nets, or whatever is necessary for the purpose of dealing with the particular cargoes.

Reference has already been made to the provisions of the dock regulations, and the requirements as to keeping certain records which will be available for inspection in regard to wharf machinery and gear.

Suitable office accommodation with provision for Customs officers is necessary with quarters for stores and canteen.

The type and conditions of labour will depend on the local position as regards the stevedoring of vessels. Generally speaking, labour is recruited from the Transport and General Workers' Union, and the conditions of employment and payment of wages are in accordance with agreements in operation with that body. At private wharves, where only a small shipping tonnage is dealt with, factory labour is utilized for occasional cargoes.

The question of owning or hiring certain types of ships is a general one. Many firms own small coasting vessels,

while others require to employ hopper barges, lighters, tugs or canal craft. Hiring against owning as an economical proposition depends for its solution on the amount of cargo or tonnage definitely to be relied upon.

Stowage.

Few laymen, and probably not many transport men, fully realize what is meant by "stowage" in the fullest sense, or comprehend the far-reaching effects of indifference to the finer arts of it. Therefore, it may be of more than passing interest to give a few of the more salient points in connection with the subject which may serve as a useful guide to the student.

The ship, naturally, in the first instance, must be fit and seaworthy to take the particular cargo which has to be stowed, whether that cargo be general, special, abnormal, on below or above decks.

The stability of the ship must be the next care, i.e. to see that the cargo is so placed throughout that the ship, by use of its ballast tanks, etc., can be kept more or less on an even keel.

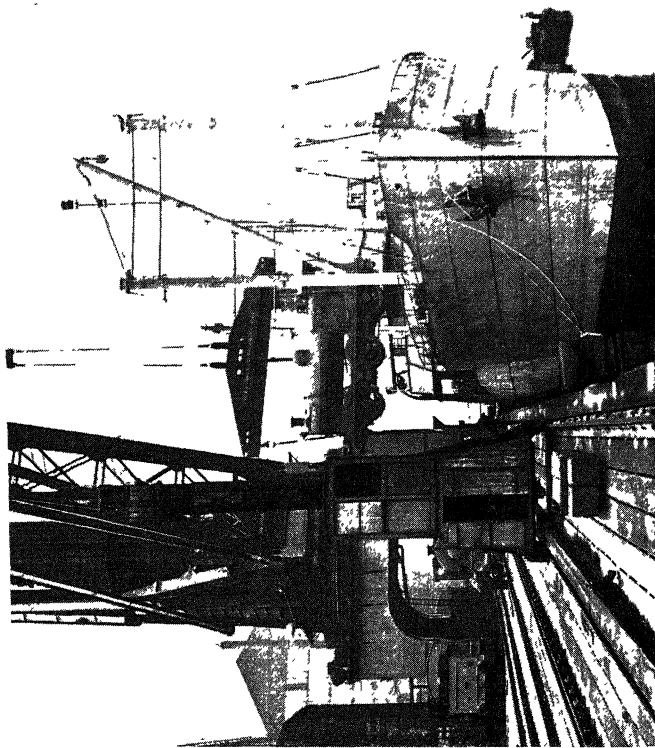
The cargo must be stowed in such a manner that the ship's crew will be adequately protected from danger, and likewise the ship itself.

The cargo, too, must be protected from damage in loading and, as far as possible, during transit, through causes hereafter mentioned.

Care must be taken to see that all available space allowed for cargo is taken full advantage of by those responsible for stowing.

In the latter connection, a stowage plan is of great importance, particularly where the cargo may be of a special nature, requiring skill in order to fit in special pieces of machinery around and about stanchions and between decks, etc.

Some facts and figures concerning the ton as a unit of measurement in shipping matters may be helpful at this stage.



SHIPPING HEAVY LOCOMOTIVES
(*Sir W G Armstrong, Whitworth & Co, Ltd*)

The principal examples of ton measurement are as follows—

ENGLISH OR LONG TON	2,240 lb 1·12 short or American tons. 1016·05 kilos, or 1·01605 metric tons.
AMERICAN OR SHORT TON	2,000 lb 0·892857 long tons. 0·90718 metric tons.
METRIC OR CONTINENTAL TON	1,000 kilos, or 2,204·621 lb. 0·98421 long tons 1·10231 short tons
SHIPPING TON	40 cu. ft. and upwards is termed "Measurement Cargo"; under 40 cu. ft., "Deadweight Cargo."
TIMBER TON	42 cu. ft.
FREIGHT TON	Purely arbitrary unit of measurement.
DISPLACEMENT	The volume of water displaced. May be measured in cubic feet or in tons, the latter generally; 35 cu. ft. of salt water being equal to 1 ton of 2,240 lb.
GROSS TONNAGE	Total under deck, 'tween deck, and tonnage of closed-in spaces above upper deck, less certain exceptions.
NET TONNAGE	Gross tonnage less non-earning spaces occupied by machinery, bunkers, tanks, master's and crew's quarters, etc.

The "stowage factor" of any commodity is the figure expressing the number of cubic feet a ton (2,240 lbs.) of the commodity will take up in stowage. This factor should always include a proper allowance for broken stowage and dunnage. It must also be remembered that the "stowage factor" is by no means absolute, but serves as a useful guide in stowage.

In connection with the careful planning of cargoes and the stowage thereof, an important point with far-reaching results often arises, namely, "port speed."

This refers to the speed at which cargo may be loaded or discharged, and will depend wholly on the manner in which the cargo has been plotted out and stowed. It will be appreciated, therefore, how essential it is for care and discretion to be used by those responsible for stowage

to ensure that there is no lost time in discharging the vessel through cargo being to a large extent inaccessible, and so probably requiring double-handling at the particular port of discharge.

The ship's officers are generally very alive to this part of stowage work, and watch carefully to see that stevedores do not commandeer all the "easy" places for placing and stowing their particular cargo.

With full ship loads of bulk cargoes this question naturally does not arise in the same manner, but the ship's officers will still see to it that their ship is so trimmed as to give it every chance to weather satisfactorily any storms which may be encountered during the voyage.

All spaces lost in stowing cargo around brackets, bulkheads, stanchions, and the like, and that space unoccupied or lost between and around packages or by dunnage, is known as and termed "broken stowage."

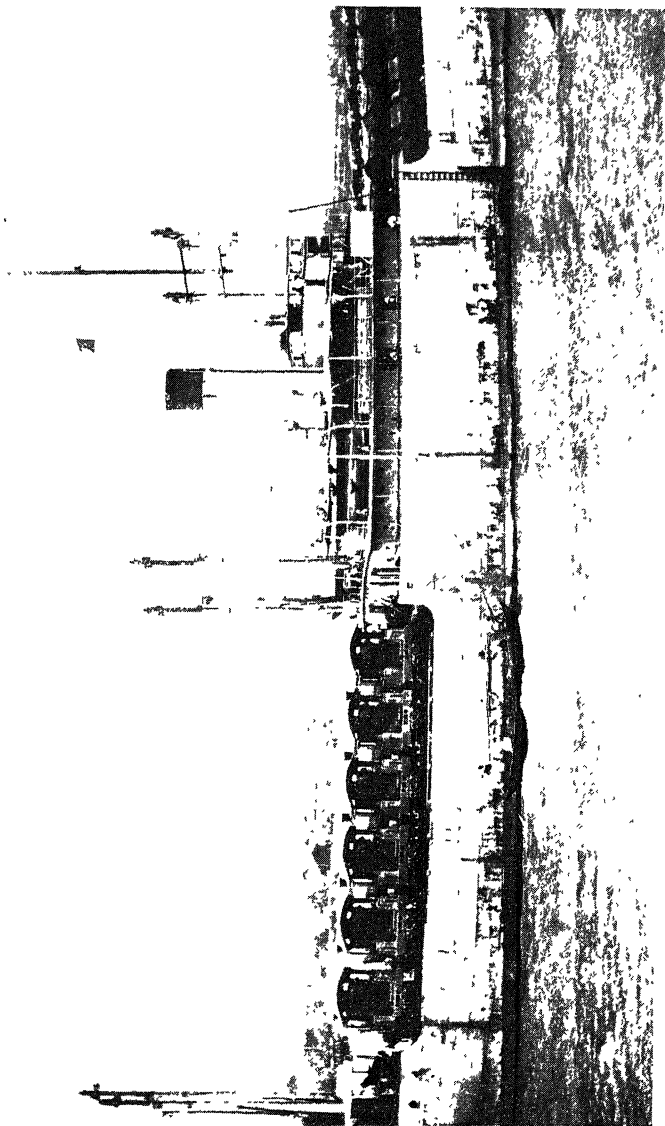
Naturally, in fine bulk cargoes of a nature which more or less trim themselves, such as sand, grain and other such commodities, loss through broken stowage is comparatively small, while, on the other hand, much valuable space is lost where the goods are irregular or bulky.

Wherever possible, all cargoes should be marked with the port of delivery as clearly as possible, as this facilitates to a great degree convenient and efficient handling of the goods.

Much damage is frequently caused to cargo in actual stowing as the result of careless handling of the gear used.

Amongst the more common causes of damage will be found the following—

1. Use of unsuitable appliances.
2. Indiscriminate use of types of slings for a particular lift and careless slinging.
3. Unnecessary dragging of packages across floors of ships or over other packages by winches.
4. Careless use of the different types of hooks, pinch and crowbars, rollers, pulley blocks, and the like.



VIEW SHOWING DECK CARGO
(*See H. G. Armstrong, Whitecoth & Co., Ltd.*)

5. Tipping packages from trays or slings and rolling others off high tiers, etc.

6. Dangerous and poisonous goods form a very important point in stowage, and much care must be taken in seeing that these goods are separated and stowed according to regulations, otherwise much valuable time is lost and sometimes heavy damages incurred if negligence in stowing can be proved.

Ventilation, drainage, leakage, moisture and sweat are also other important points which arise, and need careful study and knowledge to ensure safety.

The supply of the necessary dunnage, in connection with good stowage, is frequently a bone of contention between the ship's crew and the persons responsible for the stowing of the cargo.

Naturally, on the particular class of cargo being handled will depend the quality and quantity of dunnage necessary, but great care is required when handling special grain cargoes to see that, as far as possible, this is free from any possible contamination through faulty dunnage or tank boards, etc.

It is of the utmost importance that a correct tally of all that is placed on board and stowed should be taken, otherwise long and difficult correspondence will be the result.

Each hatch working should have a checker with a tally sheet, and, if the ship is discharging, the check should be taken at the ship's rail.

It is well to bear in mind also that, where general cargo is being dealt with, one checker cannot as a rule efficiently check two holds; it is much better and safer to have one man to tally off each hold.

The general order of stowage is, naturally, heavy pieces at the bottom of the ship and light pieces at the top. There are occasions, however, when dealing with abnormal cargoes, where heavy pieces are not only placed below, but also on deck. In conclusion, some illustrations may be of interest.

Let us take as an example the loading and stowing of completely assembled locomotives.

In the first instance, special lifting gear is necessary for placing the locomotives and tenders on board. A "strong-back" or lifting bar is made use of with the necessary extension holes for fixing slings to accommodate whatever centres may be required for each class of locomotive or tender being hauled.

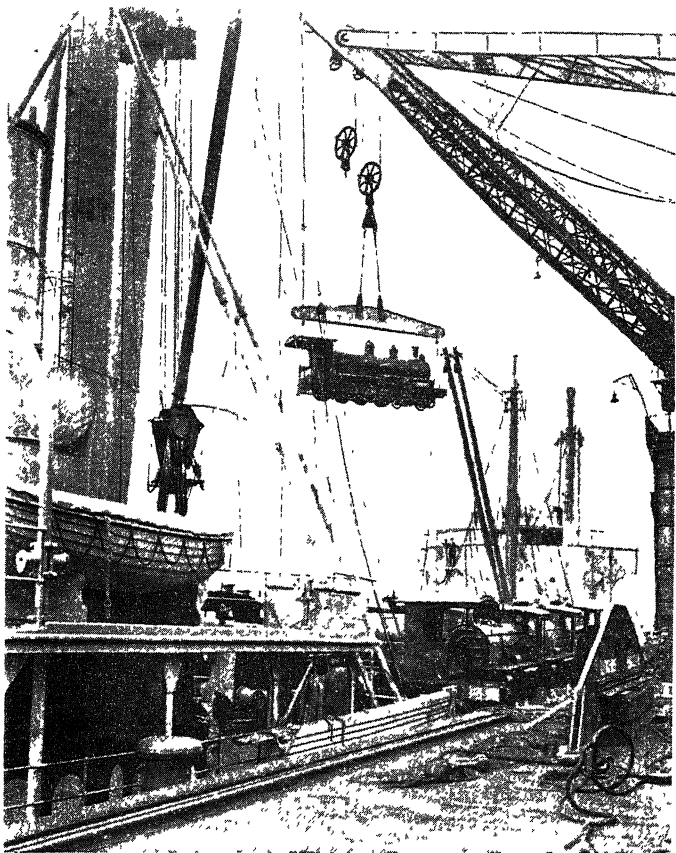
Secondly, special equipment is required when the locomotive or tender is landed below for launching into the wings of the ship. This may be done by means of rollers worked with a hydraulic ram, or some other less modern method of "skidding" on greased ways, with the help of the ship's winches for haulage crosswise.

So far as the deck cargo is concerned, the hatches require strengthening by additional beams or otherwise, and it is usual to lay steel channel bars across the hatches, which have hard timber inside with a piece cut out for the wheel flanges, to give these a proper grip when being lashed and to enable the wheels to be chocked.

Special gear for lashing the locomotives and tenders is required when they are landed on deck.

This is done by specially strong wire passed from a warrick screw, fitted on deck floor at each side of the ship, to wheels of locomotives and tenders, and then screwed up tight. Each locomotive and tender is also lashed many times to others fore and aft, although this naturally will depend on the position in which the locomotives and tenders are loaded.

Similar arrangements as afore-mentioned are frequently carried out when shipping rail coaches and rolling stock.



STOWING A DECK CARGO OF HEAVY LOCOMOTIVES
(*Sir W G Armstrong, Whitworth & Co, Ltd*)

CHAPTER X

COMMERCIAL AIR TRANSPORT

It may be said that commercial aviation is still in a state of infancy. Passenger and air mail services, however, are being rapidly developed, as the under-noted statistics will show—

Country	Route Mileage	Miles Flown	Passen- gers carried	Goods carried (Tons)	Mails carried (Tons)
Great Britain 1928 ¹	2,215	1,135,910	29,300	760	125·3
1927	2,355	873,000	20,015	602	51·0
1926	1,368	840,000	16,775	679	38·6
France . . 1928	12,570	4,534,156	19,698	1138·1	128·30
1927	8,875	3,755,380	21,555	1190·90	425·00
1926	7,285	3,244,000	18,861	1080·00	585·00
Germany . 1928	18,000	6,820,000	113,645	2089·29	340·07
1927	14,500	6,189,000	151,091	2289·33	813·83
1926	12,760	4,065,000	84,594	1040·14	542·15
United States 1927-8	10,932	5,585,224	—	—	831·1
1926-7	8,825	5,101,000	—	—	459·7
1925-6	8,665	2,635,000	—	—	231·0

The above figures are published in a report on the *Progress of Civil Aviation*, 1928 (H.M. Stationery Office, price 3s. 6d. net). This report well merits the attention of all interested in the progress of air transport throughout the world. A number of maps are included, showing existing and proposed air routes in all the important countries.

The airplane or airship as a commercial proposition in the transport of general cargo has yet to go a very long way. Meantime, the main advantage of air service is undoubtedly speed. In this connection small sample lots of goods, where the prospect of important orders is involved, can be sent to continental buyers and delivered

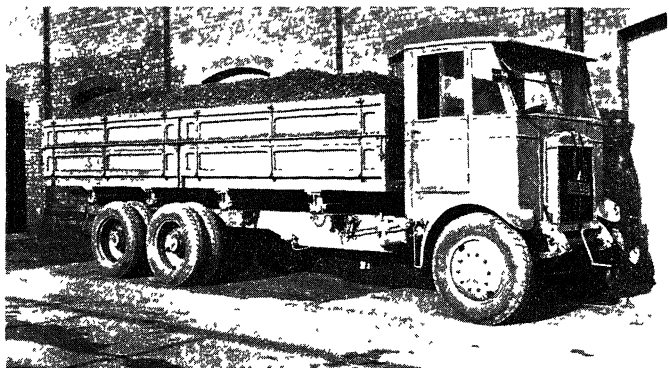
¹ Including Middle East Service in 1927 and 1928

on very short notice. It may be considered worth while to make use of air service for the delivery of spare parts to effect immediate plant repairs. Perishable goods such as fruit and flowers may be conveyed by aeroplane. The use of air transport in these respects will only be made when considerable length of journey is to be undertaken. It is, of course, understood that considerations of distance or geographical position do not affect transport in this country in the same way as in countries like Canada or Australia.

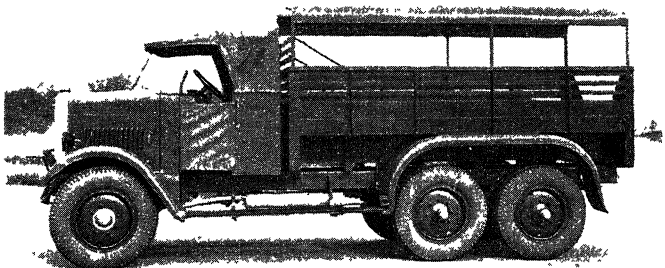
The main need in Great Britain at the moment seems to be the introduction of municipal or civil air stations in or adjacent to all large towns throughout the country. This would lead, first of all, by the innovation of regular air services, to the gradual building up of passenger, mail, and goods transportation by air, while, no doubt, air taxi and special services would develop as a matter of course.

The main disabilities under which aircraft at present operates, namely, the small tonnage or carrying capacity, heavy operating costs (although of recent years these have been considerably reduced), and unfavourable climatic conditions, will, no doubt, be swept gradually away. The important question of safety is certainly not being lost sight of, and air transport, even at the present time, can be considered quite as free from accident as any other type of transportation.

Apart from the availability of air services in this country, it is generally felt that the cost of air service for goods traffic is entirely prohibitive. At present this is possibly so, but with the advent of local air stations, together with a reduction in the cost of aircraft manufacture, there is no doubt that considerable developments in the conveyance of goods by air will be the inevitable result. In other words, the demand will be the deciding factor in the charges which require to be levied for the conveyance of goods by air.



TYPE OF 6-WHEEL (HEAVY) COMMERCIAL LORRY
10-TON



TYPE OF 6-WHEEL (LIGHT) COMMERCIAL LORRY

CHAPTER XI

INDUSTRIAL ROAD TRANSPORT

MANY industrial firms find it expedient to own and operate their own road vehicles, while others prefer to hire contractors' lorries or vans as necessary. The peculiar circumstances affecting each particular firm, its product, or extent of road delivery services, of course, will decide the economic case for or against the purchase of a private fleet. Sometimes this may be found difficult, insomuch that severe competition between contractors means that very low and favourable rates are quoted for hired vehicles.

Control and Working.

If it is agreed that private ownership is necessary, steps must be taken to work up an organization which will give the desired results. Having selected the types of vehicles best suited to immediate requirements, the next care is the appointment of drivers. This is an extremely important point in ensuring the ultimate success of the road transport department. The motor driver, in being given charge of a vehicle, can, to a very large extent, not only be the determining factor in the life of the vehicle, but also have a very great influence on the repair bill. Not only this, but drivers of motor vehicles cannot always be under supervision, and their conduct, the care of their vehicle, and the avoidance of overtime must of necessity be left to themselves. It is possible, of course, to instal recording instruments on motor vehicles, but, useful as these may be, there is no doubt that the human element has to be relied upon to a very large extent indeed.

The action to be taken on the road in case of breakdown should be clearly specified. So-called "driver-mechanics" are sometimes dangerous.

Altogether it is well worth while, and sound economically,

to give drivers a period of training and put them through a thorough test before actual appointment. This should not only cover the care and driving of the vehicle, but also include the testing of the driver's knowledge of road regulations and the rules of safety-first.

Skilful, capable, and efficient drivers should be well paid. If possible, a bonus scheme for work done, for freedom from accident, or for care of the vehicle should be introduced.

As far as possible, programmes of work for each vehicle should be adopted, and, consistent with the firm's particular requirements, district deliveries arranged. It should be the duty of each driver to keep a daily time and work record. This time and work record should show date, time on duty, time out, time in, from and to, mileage, tonnage, particulars of delays, details of petrol and oil drawn, etc. Such a record will be of extreme use to the transport manager.

It follows that for the operating section to show the best results, empty mileage, light loads, and delays at loading and discharging points must be reduced to an absolute minimum.

Obviously, there must be a proper system of road transport control. As in the case of works' locomotives, certain road transport units may be allocated to routine duties. Apart from this, all calls for road vehicles of any class should be made on a "movement order," which should be delivered at the road transport control office. This office should be under the charge of a competent control clerk. Calls made by telephone should be confirmed by a movement order. These orders, copies of which should be retained by the issuing department, should give the following details—

Date.

Time of issue.

Details of work required.

Weight.

Signature.

Completion of the order for costing purposes should show particulars of vehicle employed, time taken, date and time of accomplishment. Arrangements should be made with all departments to give as much notice as possible in their demands for road transport.

If a large number of road vehicles is employed by the firm, some system of indexing is necessary so that every unit is under eye. This may be carried out either by means of cards or discs, showing vehicles in use, available, or under repair.

The question of return loads has little bearing on the control of an industrial road transport fleet, as it is not always possible to arrange return loads by privately-owned transport, except, perhaps, in the case of returned empties.

The question of adequate garaging and all garage appurtenances requires much consideration. Besides the garage itself, which should be of suitable design and dimensions to house all vehicles and should be heated sufficiently for winter conditions, such adjuncts as washing arrangements, petrol pumps, oil store, etc., should be provided. In addition, equipment for the inflation of tyres and, perhaps for engine starting, and accommodation or means for easy greasing and lubrication are necessary. The site selected for the garage should be central to the main works site and easily accessible.

An important point in the internal movement of materials is whether road or rail transit is better suited to the needs of the moment. Where roads are available, it will be found that road vehicles can deal more expeditiously with plant breakdowns, or the transport of small lots of material from point to point. There must, however, be live co-operation between all the transport sections, and it is, therefore, best that all means of transport be indirectly at the disposal of a general traffic controller, who will decide as to the best and most economical means of transport to be utilized.

Types of Vehicles.

A quarter of a century ago there was hardly a commercial motor vehicle on the road. Nowadays it may be safely said that almost all the requirements of the trader can be catered for, and improvements and new classes of vehicles are steadily offered from year to year.

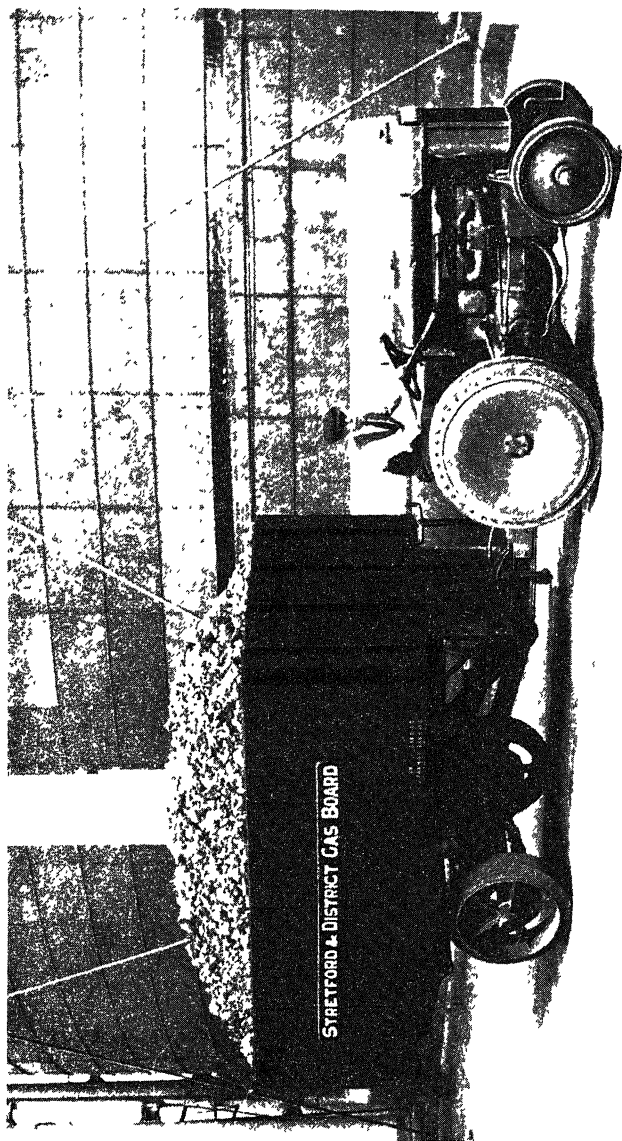
There is little doubt that for short haulage work, or for door to door deliveries or even dock deliveries by road, where there is a likelihood of delay, the horse-drawn vehicle offers the most economical proposition. This is proved by the fact that the railway companies find it profitable and of the greatest utility to make use of horses for this class of work. The question of the effect of slow-moving, horse-drawn vehicles on the general traffic problem in busy cities, of course, may influence the gradual withdrawal of horse haulage within certain limits.

The electric battery vehicle can be considered as in competition with the horse-drawn unit for the class of work already mentioned.

For heavy short distance runs, steam lorries, with trailers if necessary, will prove very efficient units, while for long distance work, petrol lorries of desired capacity can be best utilized. Multi-wheel type vehicles of high capacity are available for heavy and special loads and for covering long distances.

Increases in the price of petrol have given rise to renewed interest in Diesel engine units using crude oil. It is stated in favour of these vehicles that the operating or running costs are extremely low, and an additional advantage is quick-starting in cold weather. Maintenance costs are lower than in the case of petrol vehicles, owing to the absence of magneto, carburettor and sparking plugs.

Due cognizance must be taken of tractors for industrial transport service. These vehicles have been described as "versatile," and this is by no means an exaggeration.



TYPE OF TRACTOR AND TRAILER

For internal use in factory areas, dock work, timber yards, wagon movement, haulage of other units, and numerous other phases of transport and handling work, the tractor has become almost indispensable. So far as industrial transport is concerned, the use of trailers in conjunction with tractors is suggested as being of especial utility. Trailer trains may be made up of more than one trailer used with a tractor in order to save time and haulage charges. Tractors and trailers will be found useful in carrying out stores deliveries and for stores work generally. Trailers of the low-loading type are suggested to induce quick loading and discharging for inter-factory loads.

Light cranes fitted to tractors are of great service in industrial plants, as are also tractor shovels.

In the construction of new works, docks, roads, or for public contracting generally, six-wheeled vehicles, possibly fitted with tipping bodies, can be economically and successfully operated.

Traction engines with heavy trailers are still available for exceptionally heavy loads, such as boilers, locomotives, or rolling stock which may be out of gauge for railway transit. Articulated trailers have recently been constructed to carry loads of 100 tons over the highway.

As far as possible, the standardization of vehicles should be aimed at, in order to allow of quick and effective repairs being carried out as a result of the availability of spare parts and the practical training of mechanics on one class of machine.

Road Regulations.

Reference has already been made in the remarks under the heading of "safety first" to the report of the Royal Commission on Transport in connection with speed limits on highways, and also to the League of Nations Committee Report on road signalling.

Apart from any future legislation dealing with the control of road traffic, there are at present in force certain

Acts and Orders which require consideration and attention by all interested in the operation of road transport vehicles.

These are as follows—

Locomotives on Highways Act, 1896.

Locomotives Act, 1898.

Motor Car Act, 1903.

Road Transport Lighting Act, 1927.

Road Vehicles, Lighting Regulations, April, 1928.

Road Vehicles, Heavy Motor Car (Amendment) Order, 1928.

The transport manager is concerned with the time his vehicles take to cover a given distance or to dispose of a load. In busy areas, traffic delays and jams are now being accepted as inevitable, but the increase in delays is having serious effect on the development of road transport. In regard to traffic control, there must be some drastic change, not only in carrying out legislation, but also in the method of administration. Road transport control must be treated as a science, and its problems must not, as in the past, be left for solution to writers of letters to the editor, or to local authorities, the members of which are often entirely ignorant of the first essentials of transport management. Traffic in cities must be controlled—perhaps drastically controlled—or very soon the position within city boundaries will become impossible. There must be the appointment of expert traffic functionaries—something of this nature is suggested in the second report of the Royal Commission on Transport—the general introduction of mechanical signalling, very definite laws as to routes in large cities, the gradual introduction of roads for “up” and “down,” and for “fast” and “slow” traffic. Road traffic must be under supervision. Traffic inspectors, mounted on fast motor-cycles, must be introduced in order to deal with all cases of excessive speeding, blocking, careless driving or any misdemeanours. The question of skidding by motor vehicles on the roads deserves the attention of tyre manufacturers and road authorities.

At the present time there is a very noticeable lack of co-ordination and uniformity in the police signalling system. In addition, the policy of police traffic controllers in certain cities is to speed up road transport in order to keep the traffic moving, while in other districts there is a tendency to keep speed down, presumably with the view of avoiding accidents.

There must be a policy of "keep moving," as only by this means can congested areas be kept clear; horse-drawn vehicles must sooner or later be prohibited in certain city districts.

The dangers arising from the presence of pedal cyclists on the highways, both to themselves and to other users of the road, must be eliminated. It is suggested here that the licensing of bicycles by means of payment of a small fee is essential, and that, furthermore, stringent lighting regulations should be enforced.

The question of the issue of motor licences is bound to be subject to revision. It is reasonable to expect that driving licences will only be issued to persons medically fit, after examination in driving and in knowledge of road signals. The insurance of road vehicles is of vital importance to the country as a whole. There must be a system of compulsory insurance applicable to all vehicles using the roadways.

The second report of the Royal Commission on Transport deals very exhaustively with the question of licensing and regulation of public service vehicles. As regards the merits of taxing road vehicles on horse-power or through the medium of fuel, no doubt, changes will be made from time to time according to the views of successive Governments, but owners of commercial fleets will always be prepared to pay just and reasonable taxes on whatever basis these are legislated. Still more, if owners and drivers of road vehicles felt that laws affecting control, regulations, signalling and speed restrictions were made to be obeyed, and that the controlling authority was out to help—rather than secure police court convictions—there is

little doubt that the road transport problems in Great Britain would be well on the way towards solution.

Licensing and Registration of Road Vehicles.

The transport manager must possess full knowledge of the current regulations regarding the registering of motor vehicles. The Motor Car Act, 1903, provides that—

Every motor car shall be registered with the council of a county or county borough, and every such council shall assign a separate number to every car registered with them.

A mark indicating the registered number of the car and the council with which the car is registered shall be fixed on the car or on a vehicle drawn by the car, or on both, in such a manner as the council require

A fee of twenty shillings shall be charged by the council of a county or county borough on the registration of the car.

Furthermore, it is provided that—

A person shall not drive a motor car on the public highway unless he is licensed for the purpose, and a person shall not employ any person who is not so licensed to drive a motor car.

The council of a county or county borough shall grant a licence to drive a motor car to any person applying for it who resides in that county or county borough on payment of a fee of five shillings, unless the applicant is disqualified under the provisions of the Act.

A driving licence shall remain in force for a period of twelve months from the date on which it is granted, but shall be renewable and the same provisions shall apply with respect to the renewal of the licence as apply with respect to the grant of the licence.

A licence must be produced by any person driving a motor vehicle when demanded by a police constable. If any person fails so to produce his licence he shall be liable, on summary conviction in respect of each offence, to a fine not exceeding five pounds.

Reference must be made to the various forms which require to be filled up in registering new vehicles or vehicles transferred. When completed, the forms must be sent to the Taxation Department of the County Council or County Borough Council in whose area the vehicle is ordinarily kept.

Form R.F. 1/1 is required for "motor cars only." The annual duty payable on motor cars (other than cars electrically propelled) is £1 for each unit or part of a unit

of horse-power with a minimum duty of £6. As an example, a car of 6½ h.p. is subject to duty at the rate of £7 per annum.

In the case of goods vehicles, it is necessary to complete Form R.F.4 when applying for licence and registration, whether for a steam-propelled or internal combustion engined goods vehicle. These machines are licensed on the basis of unladen weight.

The scale of rates of full duty for annual licences expiring on 31st December is as under-noted—

VEHICLE (including a tricycle weighing more than 8 cwt. unladen), constructed or adapted for use and used for the conveyance of goods or burden of any description, whether in the course of trade or otherwise—	£	s.	d.
Not exceeding 12 cwt. in weight unladen	10	—	—
Exceeding 12 cwt. but not exceeding 1 ton in weight unladen	15	—	—
Exceeding 1 ton but not exceeding 1½ ton in weight unladen	20	—	—
Exceeding 1½ ton but not exceeding 2 tons in weight unladen	25	—	—
Exceeding 2 tons but not exceeding 3 tons in weight unladen			
Fitted entirely with pneumatic tyres	32	—	—
Other vehicles	40	—	—
Exceeding 3 tons but not exceeding 4 tons in weight unladen			
Fitted entirely with pneumatic tyres	38	8	—
Other vehicles	48	—	—
Exceeding 4 tons but not exceeding 5 tons in weight unladen			
Fitted entirely with pneumatic tyres	43	4	—
Other vehicles	54	—	—
Exceeding 5 tons in weight unladen			
Fitted entirely with pneumatic tyres	48	—	—
Other vehicles	60	—	—
If used for drawing a trailer (additional duty)	6	—	—

The term “unladen weight” as applied to motor vehicles means the weight of the vehicle, inclusive of the body and all parts (the heavier being taken when alternate bodies or parts are used) which are necessary to, or ordinarily used with, a vehicle when working on a road, but exclusive of the weight of water, fuel or accumulators (other than boilers) used for the purpose of propulsion and of loose tools and loose equipment.

Form R.F. 5/1 is necessary in respect of tractor vehicles used for general haulage purposes.

The rates are as under-noted for full licence duty over a yearly period ending 31st December—

VEHICLE WHICH IS CONSTRUCTED FOR HAULAGE SOLELY and not for the purpose of carrying or of having superimposed upon it any load except such as is necessary for its propulsion or equipment and which is not used for that purpose—

Not exceeding 2 tons in weight unladen	21	—	—
Exceeding 2 tons but not exceeding 4 tons in weight unladen	25	—	—
Exceeding 4 tons but not exceeding 6 tons in weight unladen	30	—	—
Exceeding 6 tons but not exceeding 7½ tons in weight unladen	35	—	—
Exceeding 7½ tons but not exceeding 8 tons in weight unladen	40	—	—
Exceeding 8 tons but not exceeding 10 tons in weight unladen	50	—	—
Exceeding 10 tons in weight but unladen	60	—	—

Trailers attached to tractors are charged £6 full duty for each trailer.

Form R.F. 4/1 covers electric goods vehicles, the rates being as follows—

VEHICLE (including a tricycle weighing more than 8 cwt. unladen) constructed or adapted for use and used for the conveyance of goods or burden of any description, whether in the course of trade or otherwise—

Being a vehicle which is electrically propelled:

Not exceeding 25 cwt. in weight unladen	6	—	—
Exceeding 25 cwt. but not exceeding 2 tons in weight unladen	13	—	—
Exceeding 2 tons but not exceeding 3 tons in weight unladen			
Fitted entirely with pneumatic tyres	16	—	—
Other vehicles	20	—	—
Exceeding 3 tons but not exceeding 4 tons in weight unladen			
Fitted entirely with pneumatic tyres	19	4	—
Other vehicles	24	—	—
Exceeding 4 tons but not exceeding 5 tons in weight unladen			
Fitted entirely with pneumatic tyres	21	12	—
Other vehicles	27	—	—
Exceeding 5 tons in weight unladen,			
Fitted entirely with pneumatic tyres	24	—	—
Other vehicles	30	—	—
If used for drawing a trailer (additional duty)	6	—	—

Similar conditions as regards vehicles unladen apply in regard to goods vehicles propelled by steam or internal combustion engines.

Other forms are issued relative to agricultural vans or

lorries, showmen's special vehicles, tractors used in agriculture or agricultural engines, hackney carriages, motor cycles, and invalid vehicles.

Motor fire-engines, vehicles used by a local authority for fire-brigade purposes, road rollers, ambulances, and vehicles used for the haulage of life-boats and their necessary gear are exempt from duty, but each vehicle must be duly registered and licensed by the Licensing Authority within whose area it is kept and used. Form R.F.3 (Finance Act, 1920), Claim for Exemption from Licence Duty, should be completed in respect of the foregoing.

CHAPTER XII

WORKS TRANSPORT AND COSTS

It is generally recognized that the provision of adequate and effective cost and operating statistics is necessary in order to enable responsible officials to familiarize themselves with the actual conduct of their departments. Furthermore, the cost of operating internal industrial transport units, such as locomotives and locomotive cranes, is an important item in the general cost of production.

Locomotives and Cranes.

The system of costing may vary according to the peculiar nature of the industry, but it is generally found that the cost per locomotive hour or crane hour forms a sound basis. The costs per ton for the movement of raw materials and finished products are, of course, important, but these can be worked up from the cost per hour as debited, provided that the amount of tonnage handled is known. In plants of any magnitude the weights of much of the material moved internally is not known, and the cost and delay which would be incurred in weighing everything handled would not be worth while. Again, locomotives are often used in the process of manufacture, as, for instance, in the movement of partly-manufactured articles between plants; in these cases a charge per locomotive hour is the most satisfactory arrangement. Ton-mile statistics are of very little utility in costing industrial locomotives, even were it possible to arrive at the necessary information in respect of mileage covered and tonnage hauled, to enable a ton-mile cost to be calculated. Many firms fix tariff rates per ton, the aim being to strike as nearly as possible the approximate average cost over a yearly or six-monthly period. As the main factor, however, affecting tonnage rates is the volume of traffic handled, amendments are frequently necessary to meet fluctuations.

It is now necessary to consider the method by which engine hour records can be compiled, and the necessary data sent to the accountants for their purposes. The first essential is the introduction of a form which will answer the dual purpose of checking the working, and at the same time provide details of the time occupied in carrying out each job. With hundreds of shunting operations, besides ordinary routine work, requiring attention daily, there must be some simple yet effective system of transmitting orders to the shunters, and recording the execution of the orders and the time taken on the completion of the work.

This form is called a "shunting" or "movement" order, and is issued by the department requiring the service to the traffic foreman responsible, who enters on the order the time the work has been done, the engine number, and the length of time involved in carrying out the job. The foreman issuing the order, besides giving full details of the work required to be done and the date and time of issue, has to state the department concerned, and, if a job or works order number is involved, to give particulars (retaining a copy of the order for reference). These orders are sent daily to the traffic manager's office where the information is tabulated, and at the end of the cost period engine hours, allocated against departments, are supplied to the accounts department. Of course, where engines are permanently and constantly working for particular departments no shunting orders are required, and the allocation is an easy matter, but the shunting order system is absolutely necessary in the case of shunting engines or engines not specifically allocated. In order to arrive at the proper charge per engine hour, it is, of course, necessary to include traffic expenses, including locomotive running, maintenance of locomotives, rolling stock and permanent way, plus establishment charges. This total debit is then divided by the total engine hours worked, and an overall cost per engine hour arrived at. It is then an easy matter to allocate charges to departments

by taking this gross cost and the number of hours worked and making debits accordingly. Difficulties sometimes arise in connection with an overhead engine hour charge being made in all circumstances. First of all, in connection with different sizes of locomotives. It can be understood that the engine hour figure could not be identical in the case of an 8 in. narrow gauge engine against a 16 in. broad gauge. On the whole, the engine hour as a measure of cost on output is particularly free from disturbing factors. Nevertheless, the maximum effort of output available per hour differs between locomotives and, no doubt, attempts will be made to measure these differences. Again, as regards rolling stock in an iron and steel works, for instance, where expensive vehicles are used for the conveyance of hot metal or molten slag, it would, obviously, be unfair to charge part of the maintenance of such to departments not making use of them. In this connection, the engine hour rate for traffic involving certain special vehicles has been estimated to cost 1s. per hour more than the engine hour rate for ordinary traffic movements. This basis can be used and, if necessary, revised from time to time when an analysis of the accounts is made by the management.

Reference has already been made to tariff rates per ton, and it is suggested that tariff rates—open to amendment at any time—can be arranged per engine hour. Of course, where tonnages are known, and also in cases where work may be performed for outside sources, it is a simple matter to fix tonnage rates on the realized cost per engine hour.

In the case of engines employed in general shunting work, as, for instance, in marshalling traffic in reception or dispatch sidings, the hours worked would require to be allocated as nearly as possible in relation to the amount and classes of material dealt with. Similarly, coaling and watering time, meal hours or travelling time between jobs must be spread over all the work performed.

To summarize briefly the lines under which works

traffic should be costed, for the ascertained figures to be of real use to the management, three simple main heads are suggested, viz.—

1. Maintaining the organization.
2. Maintaining the plant.
3. Carrying out the work.

These heads may be alternatively described as—

1. General charges.
2. Maintenance of—
 - (a) Permanent way.
 - (b) Locomotives.
 - (c) Rolling stock.
3. Traffic expenses.

General, miscellaneous, and establishment charges refer to expenditure incurred, not in any special department, but for the benefit of the undertaking as a whole, including head office expenses and salaries, pensions, lighting, stationery, rents, rates, etc. As will be understood, this class of expense has but slight and indirect connection with the amount of traffic handled, and will hardly decrease on any reduction of engine hours worked, or a reduction of business generally.

Maintenance charges, or the maintenance of the machinery required, cover three essentials—

1. Permanent way.
2. Locomotives.
3. Rolling stock.

The ideal, so far as managerial requirements are concerned in connection with permanent way is, firstly, the cost per mile of upkeep of running road, and, secondly, the cost of siding upkeep, plus any additional costing information which may be required in connection with exceptional expenditure, such as slag tips, wharves, etc.

In regard to locomotive maintenance, as has already been stated, it is well that the traffic manager be supplied with the cost of repairs of individual engines so that he may be in a position to judge as to the efficiency of each class of engine in operation. As to rolling stock, it may

be too much to ask for the repair charges on each individual vehicle—where large numbers of rolling stock are involved—but it is suggested that information might be supplied, taking the stock class by class. It is of little value to say that the cost of repair of rolling stock is any figure gross over a period as, for instance, in an iron and steel works, where, as has already been explained, heavy expenditure is involved in the upkeep of special vehicles.

Running expenses, or the carrying into effect of the objects of the enterprise, are the first concern. Included under this heading are such items as driving and stoking, fuel and water consumption, oils, waste, sand, lamps, shunting poles, flags, whistles, etc. There are also supervisory wages, number taking and other operating expenses, depreciation, national insurance, boiler insurance, and other like charges and expenditure.

The allocation of stores, so far as the locomotives are concerned, is a straight proposition, as stores orders are issued and proper debits made, but the question of the coal consumption presents certain difficulties. This is due to the fact that on a large plant where varying sizes of engines are employed, and cranes, cabin fires, etc., are all fed from the same bunkers, the actual locomotive coal user can hardly be ascertained. In order to get over this difficulty, a shift or daily test of each class of locomotive is suggested once per month, and the amount of coal found to be consumed taken as an average for that period. A comparison of estimated fuel with actual gross quantity of fuel used could be made when bunker stocks are ascertained at end of each accounting period.

In regard to the costing of locomotive cranes, the procedure, as already outlined, can well be followed. Tonnage figures are necessary where raw materials are loaded or discharged, and where bonus is paid to cranemen. Cranes employed on other classes of work, such as on erections or maintenance, can be charged to departments on an hourly basis.

It often happens that the transport manager has no

direct control of the rates of wages paid to workpeople, or the amount of overhead charges which has to be borne by his department. In these circumstances, expenditure is best expressed in terms of hours worked.

Road Vehicles.

The costing of a road haulage fleet can be successfully carried out in various ways, but the system adopted will be generally in keeping with the needs of the particular concern, both as regards the actual statistics themselves and the method of compiling them.

The transport manager requires to be supplied with periodical returns, showing the cost of operation and repairs to each vehicle, plus the consumption of fuel, oil and tyres.

For road transport operating in ordinary everyday traffic—apart from vehicles used internally only—ton-mile statistics, that is, one ton of goods carried one mile, will provide useful data for checking the working. Difficulty is very often experienced in costing road transport where many classes of vehicles are involved. In these circumstances, it is advisable to cost each machine or class, on the basis of horse-power and capacity.

Whether costs should be rendered weekly, monthly or yearly is a matter of opinion or necessity, but from the transport manager's point of view the more often costs and statistics are made available, the better will be the grip on the administration. It is, however, safe to say that costs made up over a lengthy period, say twelve months, are more reliable or, at any rate, offer a more complete picture of the results of operation.

This "flat" cost, covering as it will all conditions, loads and special repairs, will be of especial interest and utility. It is a sound practice to reduce the yearly non-fluctuating overhead charges on each vehicle to a weekly or daily basis. This will give effect to a saving in clerical labour, and enable a quick cost to be provided in the shortest possible time.

The costing of road vehicles can be divided under two heads, viz.—

Standing charges.

Running charges.

Standing charges will include all overhead or establishment charges connected with the organization as a whole, interest, depreciation, insurance on lorries and garages, taxes and licences. In cases where drivers are paid up-standing wages and the number of men employed remains stationary irrespective of slight fluctuations in actual work, it is sometimes considered advisable to treat drivers' wages under the heading of "standing" charges; similarly, with the earnings of foremen, clerks, washers and labourers, as these cannot be allocated immediately to one vehicle or one class of vehicle.

"Running" costs include petrol, oil, tyres, repairs, and wages.

Overhead or establishment charges are debited on a percentage basis, and, as in the case of locomotives or locomotive cranes, are usually outside the scope of the transport manager's influence.

Where trade union rates of wages are paid, the expenditure under the heading of wages—except, perhaps, in the case of overtime—is not a fluctuating figure so long as there has not been an increase in staff.

In regard to overtime, careful day to day watch should be kept on the amount of overtime worked by each vehicle, as the type of driver employed and the degree of honest service given—in the case of road transport, where immediate supervision is impossible—is an important factor.

Interest on vehicles, garages, and repair shops follows the usual rule in being placed under "standing" charges. Depreciation, or rather the amount of depreciation on road transport vehicles, offers a wide field for discussion. What is the life of a commercial motor vehicle? Is it five years, seven years, or, by means of exceptional maintenance attention, is it fifteen or even twenty years? It

is suggested that it is advisable to depreciate the vehicle heavily throughout the first few years of its life, and thereafter tail-off the figure and embody the depreciation charge with the mechanical repairs.

The most important item under the heading of running costs is petrol consumption. The petrol consumption and miles per gallon ought to be checked daily or weekly in order to see whether there is any variation between vehicles of a similar class, or whether leakage from any cause has taken place. There is a good deal of difference in the use a driver makes of an internal combustion engine both in actual driving and in starting up.

As regards oil it is, perhaps, more important to study the consumption in relation to the quality, plus the effect of cheap oil on the repair bill.

Tyre costs are affected by the types of vehicles, local road surfaces and degrees of loading.

Repair costs make it necessary for the owner to consider whether it is more economical to create his own repair shop or turn out his work to an outside source. Naturally, the size of a road fleet will have a very direct bearing on this phase of the repair question, but, in any case, the subject requires careful consideration before a repair section is actually created. Good work done by a reputable repairing concern, and the fact that heavy works overhead charges may have to be borne are important factors in deciding whether repairs will be tackled in or out of the plant.

CHAPTER XIII

TRANSPORT MAINTENANCE

It has already been suggested that it is advisable to place the responsibility for the proper repair and maintenance of all transport equipment on the head of the transport manager. This is especially necessary in cases where the amount of transport will justify the provision of special facilities for the purpose of carrying out repairs. It follows that where this course is agreed, the transport manager must place the control of the transport repair shop, permanent way and roads in the hands of a competent engineer. As has already been stated, the size and nature of the transport repair shop will depend on the amount of work to be undertaken.

Locomotives and Cranes.

Should there be a fair-sized fleet of locomotives, provision should be made for dealing with heavy, light, and running repairs. A running shed must be provided which will house the engines and allow for lighting-up, cleaning, tubing and washing-out. It is of great advantage to have the running shed erected in conjunction with the main repair shop so that engines may be easily transferred from one to the other, and in order to allow of easy access and short travelling for the repairing squads.

Works' locomotives cannot be treated in the matter of repairs in quite the same way as main line engines, since it usually happens that works' locomotives are more intensely used, especially in the heavy industries, and, consequently, require more repair attention.

Locomotive practice in industrial plants differs from railway practice in so far as firemen are not usually provided on engines of the shunting class, the driver performing the dual role of driver and fireman with, perhaps, the assistance of the shunter in coaling and watering. It will generally be found that works' locomotive drivers are

men of good class, taking a lively interest in their engines, both as regards condition and appearance, despite the fact that their work demands continual attention and watchfulness.

The standardization of works' engines, either in manufacture, design or size, is strongly advocated, as tending to keep down repair costs.

There ought to be a programme of heavy repairs so that each engine receives periodical attention consistent with the number of shifts worked. Under the category of "heavy repairs" may be classed renewal of boiler or fire-box, re-tyring, motion and gear repairs, and fitting of new springs. The insurance of boilers is a necessity, and periodical examination of boilers and fire-boxes with hydraulic tests will be carried out as a matter of course. Washing-out will be undertaken on a roster, dependent on the class of water used and engine shifts worked. Tubing also requires to be carried out at regular intervals.

In regard to "running" repairs, engine drivers should, under arrangement, book or tabulate their repairs once or twice per week. Engines are required in service, and the number of spare engines must be kept at a minimum. It is advisable, therefore, to effect running repairs as far as possible during the hours or shifts when the engines are out of service, or when they are being washed out.

Full details of all repair work carried out on each engine should be recorded for reference and for costing purposes.

Rolling Stock.

Internal works transport over rail necessitates the employment of a certain number of wagons of approved types. The calls made on these vehicles are usually intensive, and it therefore follows that maintenance and repairs must be arranged.

A wagon shop of suitable dimensions to cope with the necessary work must be provided together with certain machine tools, such as boring and morticing machines, saws, lifting tackle and blacksmith's equipment. Sufficient

spares must be kept on hand to allow immediate repairs to be carried out on any particular type of vehicle.

An arrangement should be entered into whereby wagons requiring repairs are set at the repair yard immediately any defect is observed so that additional cost and the risk of accident and derailment are avoided as far as possible. Steps should be taken to have repair labels affixed to all defective wagons, and it will then be the responsibility of the operating section to have the vehicles taken out of traffic. The actual repairs should be carried out as expeditiously as possible, as, in all probability, the stock of internal wagons will be kept at a minimum consistent with actual traffic requirements.

Strict records should be kept of the repairs effected on each wagon and the cost carefully considered. If the vehicles were second-hand when purchased, it may be economical to carry out light or running repairs, and when heavy repairs are necessary to scrap the wagon and replace by other second-hand stock. Works' wagons should be maintained in good condition, well painted and boldly lettered, and the carrying capacity and tare weight should be plainly shown. The numbering of internal stock is important so that weighing and other records may be kept correctly.

In cases where private wagons have to pass over the main line, certain Railway Clearing House Regulations in connection with the running of private wagons have to be observed. As regards repairs under this head, arrangements can be made to have running repairs carried out by a reputable firm of wagon repairers under contract. Wagons may be hired for main line or internal purposes, repairs being carried out by the owners.

Road Vehicles.

The first consideration of the transport manager in connection with the repair of the road vehicles under his control is whether the repairs will be carried out within the factory or contracted to an outside source.

It is superfluous to stress the need for efficiency in the upkeep of commercial road vehicles, as only by regular maintenance and overhauling can running costs be kept at a minimum and accidents avoided. A programme of repair work is strongly urged, which will ensure that every unit passes into the shops for periodical inspection and repair.

The organization of the road transport repair shop will require that certain experts be employed to deal with various defects. Specialist workmen may be allocated to deal with electrical trouble, carburettors, magnetos, gear-boxes, steering, etc., the number depending, of course, on the size of the shop and the amount of repairs to be undertaken.

The question as to whether, after five year's life, road transport vehicles should be scrapped or replaced is an important one to the transport manager. More stringent road regulations will, undoubtedly, lead to strict economical survey before machines of five years of age or over are put through a heavy repair. Not only this, but improvements in the design of commercial vehicles from year to year make replacements range more and more in the forefront of consideration.

Should it be decided that repairs are to be carried out by the firm themselves, there must be very close liaison between the operating and maintenance sections. In addition to the adherence to a programme of repairs as already suggested, allowance or special arrangements must be made to deal with running or emergency repairs or breakdowns. The number of spare vehicles necessary in order to meet the needs of the repair programme requires due consideration. Where there is a continuity of heavy work there must be a large repair margin; 20 to 25 per cent is reasonable in most cases. In circumstances where a multiplicity of types of vehicles is employed, the position as regards spares would vary with the numbers of each type.

As regards garage workshop personnel, the need for sufficient skilled mechanics cannot be too strongly stressed.

There is a tendency in many quarters to employ so-called "handy" men instead of the skilled artisan, but it is generally found that this is an entirely wrong policy to pursue. Faulty and careless repair work very soon makes itself known in increased repair costs. There are, of course, many jobs available for the useful semi-skilled man, but it is left to the garage supervisor to see that the repair work is allocated to the men best fitted to undertake it.

The proper supervision of a garage workshop is most essential. A complete knowledge of the general principles of motor mechanism or the internal combustion engine must be held by the supervisor in order that he may act as consultant in all questions of difficulty put before him.

The costing and recording of repair jobs should be carefully undertaken. A card system with full details of the record of each vehicle is essential in that the utility of the various types can be carefully examined in order to see whether repairs are reasonable and consistent with the nature of the work carried out.

Permanent Way.

With the tendency towards heavier axle loads, and in consideration of the fact that locomotive cranes may be required to accomplish heavy lifting work while using the permanent way, it is advisable that the lay-out programme should provide for rails of heavy section. New rails, 90 lbs. to 100 lbs. per yard, are suggested for axle weights of 17 to 20 tons. In renewing internal tracks it may be necessary to replace by heavier section in order to save maintenance costs. Rails should be rolled to British Standard Specification, and should conform to the following analysis—

Carbon, from 0.35 to 0.50 per cent.

Manganese, from 0.70 to 1.00 per cent.

Silicon, not to exceed 0.10 per cent.

Phosphorous, not to exceed 0.075 per cent.

Sulphur not to exceed 0.08 per cent.

The test piece should have an ultimate tensile strength of not less than 40 tons per square inch nor more than 48

tons per square inch, with an elongation of not less than 15 per cent upon the standard test pieces.

Sleepers should be cut from selected timber (Baltic fir is suggested), and the accepted lots should be stacked and left for a period of not less than six months. Arrangements for the proper creosoting of the sleepers should be made, and this should be carried out under inspection to see that proper impregnation is attained. The creosote should be heated to 120° F., while a force pump has to be used to ensure a pressure of at least 100 lb. per square inch.

The arrangements made for boring, adzing and chairing will depend on the quantity of sleepers required. The use of steel sleepers in industrial works has received close consideration, but, apart from a flat sleeper used where burning by hot metals, slag, or ashes takes place, the standard steel sleeper has not found favour.

In regard to chair design for rails between 85 lbs. and 95 lbs. per yard, chairs of 45 lbs. to 50 lbs. weight are necessary, the area of base being 100–110 sq. ins. Cast iron chairs are usual, but cast steel chairs are often required at places where exceptionally heavy working is common. On curves or where cranes are employed, the chairs should be fully bolted to the sleeper to prevent lateral thrust. Sound well-seasoned oak keys are recommended. Keys are very apt to shrink due to variation in weather conditions, and steps should be taken to counteract this by means of wooden liners.

Fishplates of approved design should be used in accordance with the type of bull-head rail adopted.

The original attention given to ballasting and bedding will afterwards be proved by the state of the permanent way and the cost of its maintenance. Drainage should be given special consideration in order to avoid future trouble and expense.

Formation level should at least be 2 ft. below rail level, with a slope to the sides to allow of drainage to side drains. Bottom ballasting should consist of whinstone or

slag covered with about 6 ins. of ashes. A path, ash-covered, slightly lower than the sleeper end, should be allowed for to facilitate the work of shunters and other personnel.

The internal and private mileage of permanent way and the traffic density will determine the number of men required to be allotted to repairs and maintenance. A certain number of men must be set to inspection and point oiling, while the remainder will be divided into squads covering given areas. It may be necessary to allocate a larger squad to deal with relaying or emergencies. If the traffic work demands, platelayers will require to be available for night duty or over week-ends in case of derailment or damage to permanent way at these times.

Defects or weaknesses in permanent way should be dealt with promptly in order to keep down costs and risk of derailment and accident. Strict attention should be paid to permanent way maintenance costs, as these form an important item in traffic expenses generally.

Roads.

Those factories which rely to a large extent on road transport for the internal movement of their goods are greatly interested in road maintenance costs.

We will presume that roads have been constructed of a type most suitable to the conditions prevailing within the factory. If the traffic is of a heavy nature, reinforced concrete or tarred macadam may have been used in order to withstand both the heavy traffic and weather conditions. The extent of maintenance costs will depend on the amount expended in the making of suitable roads in the first place. Roads—which are not roads, but consist merely of a layer of rubble and ashes, which is churned up in the winter season to a mass of mud and wheel ruts—are not an economical proposition. The additional wear and tear on road vehicles, the cost of fruitless endeavours to keep down the mud nuisance, and the

general discomfort occasioned to all concerned because of inferior roads are not really worth while.

When it has been decided to lay down proper roadways, care should be taken to see that it is not necessary to tear them up later for any purpose such as the laying of pipes or cables, etc.

Hardly any class of factory nowadays can do without roads as road transport is making advances into all kinds of industry; and, consequently, facilities must be given to allow full advantage to be taken of this innovation. It must be admitted that due credit to-day should be given to the road makers, whose efforts in the direction of improved roads and road surfaces have contributed so largely to the improvement which has taken place in commercial road vehicles.

So far as the maintenance of factory roads is concerned, as has already been stated, costs are an important factor. If the road area is large, mechanical means of tar spraying or sweeping may be adopted as an alternative to expensive labour costs. Tar as a surface dressing material is now being used generally, while, in cases where bitumen is used in binding, crushed slag, whin chippings or slag dust is used for dusting.

No definite procedure can be laid down in regard to road maintenance, the factors of traffic, weather, and local conditions at each factory all having to be taken into account.

Nevertheless, the question is one of particular interest to the transport manager as affecting efficient service and cost of transport as a whole.

CHAPTER XIV

RESEARCH IN TRANSPORT

IN these days of the perpetual slogan, "What shall we do with our boys," it is strongly suggested that transportation will offer increasing scope in at least an interesting career.

It can safely be said, too, that there is no diminution in the forms of transport used, and with the rapid development which is taking place in so many countries, the field of transportation is bound to extend and, with it, the opportunity for employment.

The Transport Profession.

Let us examine for a moment the present range of transport both at home and abroad. Railways at home continue to develop despite reduced traffics actually conveyed over rail. The recent co-ordination of rail and road services, and the financial interests in road companies, which the railway companies are gradually absorbing, prove the trend of events. In addition to this, British railways are interesting themselves in transport by air, showing also that the long-view is being adopted.

Railways in the Colonies and British-controlled railways in foreign countries still continue to offer wide scope for advancement in the transport profession.

Developments in the road transport industry are rapid indeed. Here we see the need for still further co-ordination and co-operation, if not actual rationalization. There is no immediate sign of road transport development coming to a dead-end. Indeed, road transport will continue to offer a broad avenue of progress for many enthusiastic pioneers.

Road transport lends itself to specialist study in passenger transport, whether in tram or omnibus services. On the other hand, commercial road transport can be

divided up into sections of contracting, or fleets operated by industrial organizations for their own benefit.

Air transport is in its infancy. Who can foresee the developments in transport by air over the next decade? Surely we have not more than started on this extraordinary transportation expedition, if such it may be called. The boy of to-day will have opportunities offered to him in the field of air transport which, perhaps, will be greater than anything hitherto offered in the profession.

And what of water transport? We are still an island nation dependent on shipping for our very living. Our shipping business abroad still continues to hold its own despite many vicissitudes, and will continue to do so for many more years to come. Before long we may see canals coming once again into their own. River transport is showing signs of re-awakening, as witness the efforts to rehabilitate passenger transport services on the River Thames.

Yet another vista opens out in the transport profession. The importance of distribution abroad, the arrangement of distribution centres all over the world, and the study of foreign transportation methods in their relation to British export trade all must be made subjects of intensive investigation. The importance of this phase of distribution, especially as it affects the industrial transport officer, cannot be over-estimated.

Last, but by no means least, can be taken commercial or industrial transport management. This category is, after all, only in embryo, and a gradual development must take place in the status and in the increased necessity for the industrial transport manager. Commercial transport management, embracing expert transport opinion sought by chambers of commerce, industrial associations representing all classes of industry, and regional planning committees is a growing need. Industrial transport management with which this volume mainly deals can also be looked upon as having before it no mean future.

We see more and more the proof of the effect of the

development of transportation methods on the progress of civilization, and there can be no doubt that the transport profession offers, and will continue to offer, scope for the best brains in the country.

The Science of Transport.

Since transport of one kind or another has been used from the earliest times, it is difficult to understand why more attention has not been paid, especially in recent years, to the development of transport science.

Undoubtedly, the advent of the Institute of Transport has given marked impetus to the movement. The local branches of the Institute give exceptional opportunity to members of all branches of the transport industry to meet at convenient centres, and discuss their various problems to the mutual advantage of all concerned.

The Industrial Transport Association, dealing specifically with the industrial transport profession, has also filled a long felt want in calling general attention to the important part which it plays in our industrial life, and the necessity for specialist handling of industrial transport problems. This association has also formed branches throughout the country which enable all interested in industrial transport to take active part in the discussion of current transport topics.

Transport subjects are now being treated at an increased number of universities and colleges throughout the United Kingdom so that additional opportunities exist for study by students or others in the profession. The curriculum at present offered is, however, hardly comprehensive enough because subjects of vital concern to students particularly interested in industrial transport management are scarcely touched upon.

It will be realized from what has been said in this volume that the industrial transport manager has to undertake a very large variety of duties and responsibilities, and it is imperative that facilities should exist for education in all necessary directions. At the present time

the majority of transport managers are selected on the basis of their experience. This is satisfactory up to a point, but it is suggested that a scheme of training for students or apprentices should be available, similar to that in other branches of industry, as, for instance, engineering, accountancy, salesmanship and many others.

In this direction we are very far behind American traffic men who, through the medium of the associated traffic clubs and their educational and research committees, are given every facility for improving their status and their profession. Not only this, but in a campaign, which the United States Department of Commerce has inaugurated against industrial waste, references are made in a report to the value of adequate traffic departments to industry. The possibilities from efficient industrial traffic departments are indeed great, but the vital need at the moment is the proper education of those who are to undertake the task of supervising and operating these sections of industry. Perhaps the present laxity can be laid at the feet of industrial traffic men themselves in that they have hitherto failed to endeavour to raise the status of their profession and, furthermore, have taken no steps to see that the younger generation have had an opportunity to benefit from their tried experience. A well-known personality once gave utterance to the altruistic dictum that every individual owes a part of his time to the elevation of the business or profession in which he is engaged. Is it too much to ask that our present generation of industrial traffic managers show a little self-sacrifice for the good of those who will follow them, and for the general benefit of the community?

Then again, it is not sufficient for industrial traffic men, or, indeed, for anyone engaged in the transport industry, to shut themselves up in watertight compartments, thinking only of their particular transport life and difficulties. Means should be found, possibly through the medium of the associations already referred to, to learn as much as possible of the problems and difficulties of transport as

a whole. Not only this, but there must be co-operation with the other sciences which are closely allied to transport, and without which transport would be useless. The means of propulsion, road making, the building of aircraft and steel-making are only a few of the other branches which should be correlated with the science of transport.

There is an endless field available for research within the purview of transportation. Our future and the welfare of mankind depend on transport—on the provision of adequate and economical means of movement of passengers and goods throughout the world. Let us hope that there will be no repression of effort from all who are interested in transport affairs, but rather a great revival in order to achieve the desired end.

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